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Neurophysiology a Physical Therapist Should Know — FISCHER

The Development of Motor Control for Walking in One Hundred Cerebral Palsied Children — SALWAY

An Experimental Study in the Neonatal Guinea Pig on a Possible Cause of Cerebral Palsy — FLANAGAN and BECKER

Basis for Selection of Mobilization Technics — EGLI

Case Reports
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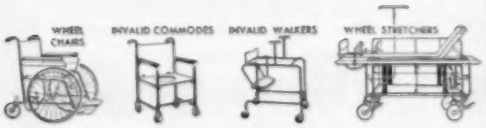

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Physical Therapy Review

November, 1958
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The *Physical Therapy Review* is published monthly by the American Physical Therapy Association, 1790 Broadway, New York 19, N.Y. Reentered as second class matter August 11, 1949 at the post office at New York, N. Y., under the act of Congress of Aug. 24, 1912.

Subscription rates: $6.00 per year to nonmembers: $6.75 in Canada and foreign countries. Single copies 75¢; to members 50¢; back issues 50¢.

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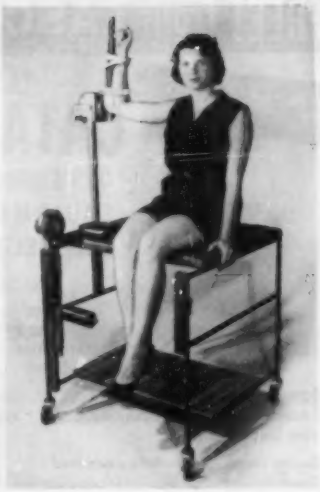

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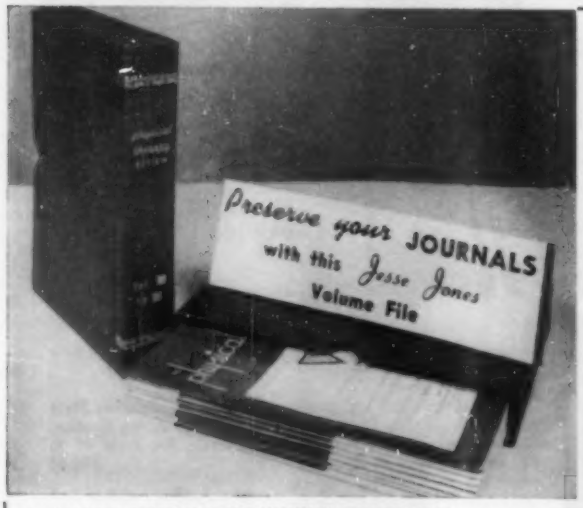

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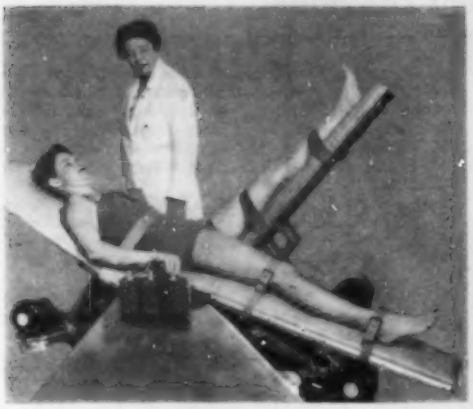

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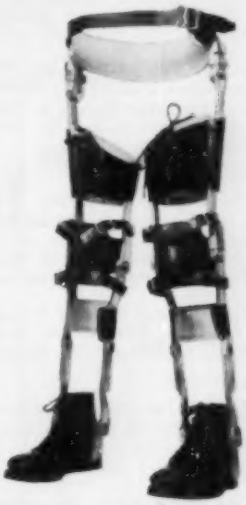

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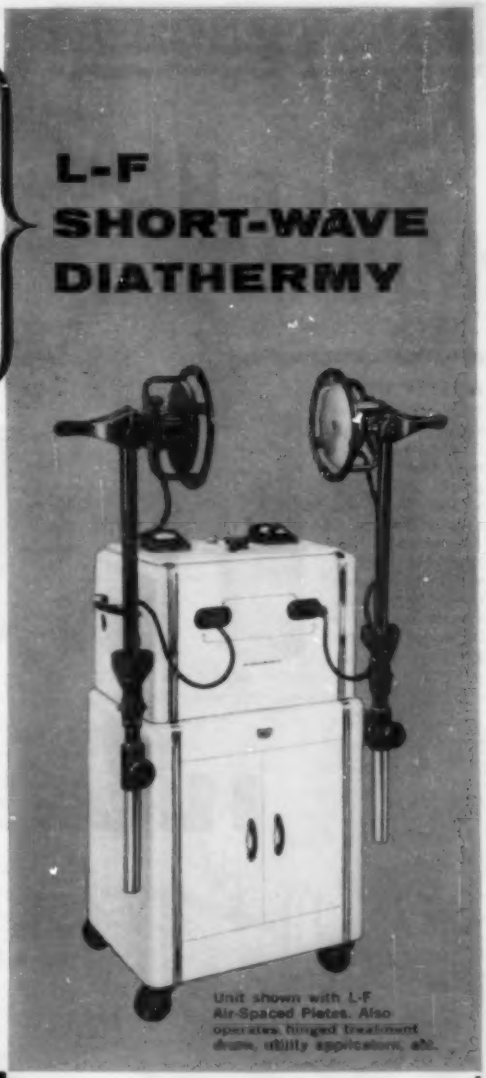

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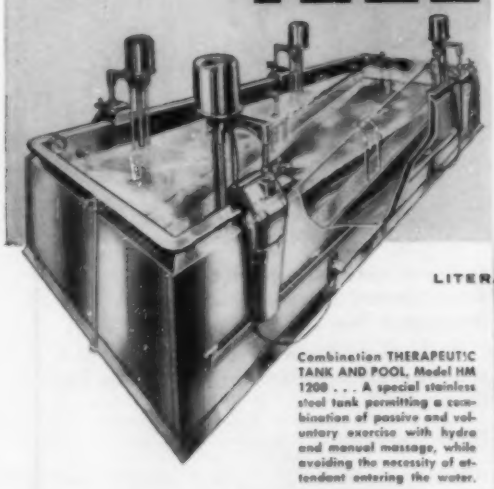

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Neurophysiology a Physical Therapist Should Know*

Ernst Fischer, M.D.

I know that much that I will discuss today is familiar to many of you. However, there are a number of newer discoveries and concepts in neurophysiology which I want to emphasize and, to discuss them intelligently, I have to develop in your mind a more or less coherent visualization of the function of the central nervous system (CNS).

Although I am accustomed as an experimental neurophysiologist to create artifically special experimental conditions in which it becomes possible to study functions of the CNS apparently restricted to control by very small parts of the CNS, I want to make it clear from the beginning that I am convinced that in normal and pathological conditions the functions we are observing are rarely brought about by occurrences restricted to limited parts of the CNS. This does not mean that for certain functions or malfunctions observed, the integrity of all parts of the CNS is of equal importance. For the performance of many functions, the integrity of certain areas of the CNS is absolutely essential. With complete damage to a specific area, the particular function will be missing completely; e.g., a certain muscle will be completely paralyzed if in a certain area of the spinal cord all the anterior horn cells sending axon cylinders to the muscle in question are destroyed. However, if not all the anterior horn cells are destroyed, or if they are only damaged somewhat, the functions of the muscle still present depend very much on functional occurrences in other parts of the CNS. If the functioning of damaged parts of the CNS could not be influenced by activity in other parts of the CNS, no rehabilitation, no reeducation of motor performances would be possible.

Professor of Physiology, Medical College of Virginia, Richmond.

* Presented at the Annual Conference of the American Physical Therapy Association, Seattle, June, 1958.

Spinal Reflex Activity

To make the functional interrelation between different parts of the CNS clearer, let us consider first simple muscle reflex actions such as can be observed when the spinal cord is severed, by an experimental cut, from the higher part of the CNS. As you all know, such a spinal animal exhibits a large variety of reflex activities as long as there is no interference with the integrity of the spinal reflex arcs consisting of the afferent neurons, the pool of internuncial neurons, and the efferent neurons. The first of the two main classes of reflex activities is that of the exteroceptive reflexes. They are elicited mainly by stimulation of skin sensory endings, they have multisynaptic reflex arcs involving large parts of the internuncial pool, and the reflex activity does not present contraction of a single muscle, but

ther a coordinated joint movement with well ntrolled reciprocal innervation of agonistic nd antagonistic muscles.

The second main class of reflexes is that of the proprioceptor reflexes elicited mainly, but not exclusively, by stimulation of the muscle spindles and the Golgi sensory endings in the muscle tendons. These reflexes are involved in so-called myotatic activity and supporting reactions. The so-called stretch reflexes are a special simple type of myotatic reflexes. These stretch reflexes have received special attention from the neurophysiologists, since, provided the eliciting muscle stretch is of short duration, the reflex response can be limited to the muscle stretched, and the response is due to activation of monosynaptic reflex arcs only, without any involvement of the internuncial pool. Since under these conditions only a single synapse must be passed, a careful study of this type of stretch reflex reveals the various facets of synaptic functions: such as excitatory state, critical state of excitation, temporal and spatial summation.[1]

Unfortunately, this concentration of the efforts of the physiologists on the monosynaptic proprioceptor reflexes has often created the impression that all proprioceptor reflexes are monosynaptic. It is well known now that with large or prolonged stretch the proprioceptor response is not restricted to the muscle stretched. It was recognized years ago by Gedevani[2] that often, of a volley of impulses reaching the spinal cord via a single afferent proprioceptor nerve fiber, only the first impulse will reach a given anterior horn cell directly, while later impulses pass partly via internuncials to the anterior horn cell in question. It could be also demonstrated[3] that the effect of even a single proprioceptor impulse is not restricted to the muscle of its origin, producing contraction, but will simultaneously inhibit anterior horn cells innervating antagonistic muscles.

The whole problem of reflex activity, especially of the proprioceptor reflexes, has become complicated by the relatively recent recognition of the function of the fine motor or γ afferent fibers, well known anatomically for a long time, which leave the spinal cord together with the large motor fibers and do not supply the motor units, but represent an afferent innervation of the muscle spindles. It is now well established[4] that impulses reaching the spindles through the γ fibers render the muscle spindle much more sensitive to mechanical stretch. This γ fiber system has a tonic excitatory outflow, which is easily altered by functional changes at various levels of the CNS.[5] Any pathological increase in stretch reflex sensitivity can no longer be explained solely by an increased sensitivity of the spinal cord reflex mechanism, but should also be analyzed in respect to changed tonic γ fiber outflow. Unfortunately, such an analysis encounters at present considerable technical difficulties.

As stated before, not only in all exteroceptive reflexes, but also in many proprioceptor reflexes, there occurs simultaneously excitation of the anterior horn cells of one muscle group (the agonists) and inhibition of the anterior horn cells of another muscle group (the antagonists), leading to the classical picture of reciprocal innervation.[1]

Excitation and inhibition

What are the synaptic mechanisms for excitation and inhibition? You are well aware that on the surface of the body and dendrites of an anterior horn cell, we find hundreds of endbulbs, synaptic knobs or buttons representing the branch endings of the axons of internuncial neurons or of upper neurons. An impulse conducted in such an axon will reach all its endbulbs at about the same time and raise the excitatory state of that part of the anterior horn cell surface covered by the knobs in question. As a rule, the alteration of the membrane surface brought about by a single arriving impulse is restricted to a small area of the anterior horn cell surface and is not great enough to raise the excitatory state to or beyond the critical excitatory state. Only when the excitatory alteration reaches the critical level will the anterior horn cell discharge and send an impulse through its axon cylinder to the motor unit. Such a discharge can occur only if a large enough part of the synaptic surface is altered sufficiently, as can occur with a single arriving impulse in monosynaptic stretch reflexes or by spatial or temporal summation of the synaptic effects of several arriving impulses. Temporal summation is possible, since the synaptic alteration caused by one arriving impulse lasts for a definite but very short time, so that if several impulses arrive through the same pathway, separated by intervals short enough, the critical level of excitation may be reached by summation of these alterations. In spatial summation, two or more impulses reach the synaptic membrane simultaneously at different endbulbs via different pathways. Thus, a larger fraction of the total synaptic surface is altered, and due to partial

overlapping the critical level of excitation might be reached. Without spending more time on synaptic excitation, I only want to point out that the critical level for discharge of an anterior horn cell depends both on the fraction of the surface altered and on the size of the alteration. If the total alteration reaches the critical level, the cell will discharge. If the total alteration is maintained by further arriving impulses, the anterior horn cell will, excluding fatigue, discharge at an even rhythm. Should an increase in frequency of arriving impulses occur, the total excitatory state further increases and the anterior horn cell will discharge at a higher frequency.

We speak of synaptic inhibition, either when an added afferent nerve excitation diminishes the frequency of an already discharging anterior horn cell, or when such an added excitation renders the synapse less sensitive to simultaneously arriving impulses, which when arriving alone would cause discharge of the anterior horn cell. There is much discussion about the detailed mechanism of synaptic inhibition. I am inclined to believe that there exist several distinctly different mechanisms for synaptic inhibition in the CNS, of which I will mention only two. We have discussed that with an increase in frequency of arriving impulses at the synaptic membrane, the anterior horn cell will also discharge with increased frequency. However, it is well established that the process of synaptic summation has definite limitation, and that when the frequency of incoming impulses increases beyond a certain range, the frequency of the anterior horn cell discharge will diminish instead of increasing. This phenomenon is often called the Wedensky type of inhibition. Due to the arrangement of the internuncial neurons in multiple and in closed chains or reverberating circuits, the likelihood exists that impulses will reach the anterior horn cells at a higher frequency than that with which they enter the internuncial pool. The chance that anterior horn cells will be inhibited increases with size of the fraction of the pool the impulses have to pass. This apparently plays an important role in reciprocal innervation.

In recent years, more and more evidence has been accumulated demonstrating that there exists on many synapses not only the above discussed type of excitatory endbulbs, but also a type of inhibitory knobs, which when activated by arriving impulses decrease the excitatory state of the synaptic membrane. Such inhibitory endbulbs blocking the discharge of an otherwise activated anterior horn cell have been well established for the simultaneous inhibition of antagonistic anterior horn cells in short stretch reflexes, in which no internuncial pool activity is involved.[5] In this example, the inhibitory endknobs are innervated from a branch of the axon of the agonistic anterior horn cell. This mechanism is probably also responsible for the often reported fact that direct electrical stimulation of a muscle can relax pathological tonus or spasticity in its antagonists.[7] As you will remember, in direct electrical stimulation of a normal muscle we are not stimulating its muscle fibers but the intramuscular motor nerve fibers. Since an artificially stimulated nerve fiber conducts excitation in both directions, the inhibitory endbulbs on the antagonistic anterior horn cells will be activated by antidromic conduction.

The present discussion of spinal cord reflex activity might have created the impression that spinal cord reflex activity is monotonous, and that the exact type of activity elicited reflexly is predetermined solely by the type of afferent impulses initially entering the spinal cord. This is only true, however, for perfectly controlled experimental situations, in which all secondary conditions are kept uniformly constant. Besides the reflex eliciting afferent impulses, other afferent impulses from the skin, from muscle, from joints, and even from the viscera, constantly enter the spinal cord. Changes in these afferent impulse patterns can influence the reflex activity considerably. It must be kept in mind that the anterior horn cells in one specific segment of the spinal cord are not only reached by afferent impulses entering that segment, but by the internuncial pool and also by the short spinal cord pathways as well as by afferent impulses entering the cord at quite different levels.

The influence of the nonreflex-eliciting afferent impulses upon the reflex activity of a spinal animal is best demonstrated by the classical experiment of Magnus,[8] in which even complete reflex reversal occurs. A spinal cat is lying one time on its left side with its tail hanging down over the table edge, but the second time on its right side. If the tip of the tail is stimulated either mechanically or electrically, the tail will move upwards in both situations. That means that lying on the left side, the reflex effect is contraction of the right tail muscles with simultaneous inhibition of the tonus of the left tail muscles. The same reflex stimulation, when the cat is lying on its right side, inhibits the tonus of the right tail muscles and activates the left tail muscles. Similar observations of the in-

fluence of body position on the resulting reflex elicited by a given stimulation could be demonstrated for limb reflexes. For any limb more or less in extension, the chances for eliciting flexor reflexes is higher than for eliciting extensor reflexes; whereas for a limb in a more or less flexed position the opposite is true. Long before the underlying mechanisms were well understood, von Uexküll [10] described the experimental facts by stating that in reflex activity the spinal cord will guide the excitation to that muscle group which is most stretched at the moment the eliciting stimulus is applied. We know now that in vertebrates this results from the raised excitatory state of the anterior horn cells of the stretched muscle brought about by the arriving afferent impulses from their proprioceptors. But not only is the proprioceptor pattern at the moment of reflex stimulation of importance, but also the proprioceptor pattern during execution of the reflex movement.

It is well recognized that due to the arrangement of the muscle spindles in parallel to the contractile muscle fibers, and of the Golgi endings in series to the muscle fibers, the afferent proprioceptor pattern is quite different when muscle tension is caused by passive stretch or by muscle activity.[11] In the latter condition, the afferent impulses from the muscle spindles decrease and those from the Golgi ending increase, whereas during passive stretch the impulses from both types of proprioceptors increase. It is obvious too, that the same mechanism is responsible for the fact that the reflex elicited is also partly dependent on how much passive resistance is encountered by the reflex movement. Furthermore, the sensory nerves from around the joint capsules send afferent impulses into the spinal cord; and the patterns are different for joint position and for velocity of joint movement.[12]

Pathological alteration

Under pathological conditions, pathological alterations of the anterior horn cells themselves can influence reflex activity. Until recently, these alterations were regarded as affecting uniformly, either lowering or raising, the threshold of synaptic transmission for all types of afferent impulses. However, clinical experience indicated that synaptic transmission can be affected differentially; e.g., in some poliomyelitis patients transmission of volitional impulses to anterior horn cells can be very much impeded or even completely blocked, yet impulses from the muscle proprioceptors pass to the same anterior horn cells more easily than normally (certain types of spasm and spasticity during activity of antagonistic muscle).[13] It could be shown that minor pathological alteration produced experimentally only in anterior horn cells, can alter them so that they still respond to impulses coming from exteroceptors, but no longer to impulses arriving from proprioceptors.[14]

Changes in the reflex activity can also be brought about by degeneration of some endbulbs on the anterior horn cells as occurs in diseases and at a rather slow but progressive rate during normal aging.[15] This probably also explains why, generally speaking, the ability to learn new motor skill decreases with age.

McCouch [16] reported recently very interesting experimental evidence that increased spasticity after degeneration of endbulbs of upper neurones (complete cord severance) is probably due to sprouting from the fine axon branches of afferents or internuncials leading to still functioning endbulbs. These sprout finally from new endbulbs replacing the degenerated ones and thus increase the influence of exteroceptors and proprioceptors on the anterior horn cells as evidenced by spasticity and susceptibility for mass reflexes.

Before leaving the discussion of spinal cord activity, it should be pointed out that what has been said about the general influence of limb position upon reflexes elicited is not only true for the limb involved in the reflex. The position of the opposite limb also influences the reflex elicited. This influence is usually less pronounced and, due to the principle of reciprocal innervation, the influence of the position of the opposite limb is mostly in the opposite direction to the influence of the position of the limb involved in the primary reflex activity. It is easier to get a flexor reflex in the primary limb when the opposite limb is extended; yet with the opposite limb flexed, the extensor reflexes are facilitated. If the spinal cord is cut at a high cervical level, it can be demonstrated that to some extent forelimb reflexes are influenced by hindlimb position, and vice versa. In such preparations, due to the influences of the afferents from a large part of the total body, the reflex activity becomes very variable, and many of the more complicated reflexes may look like purposeful movement, e.g., scratch reflexes in spinal dogs.

CORTICOSPINAL INTERRELATIONSHIPS

Seemingly purposeful reflexes lead us to the old problem; does the CNS in so-called "voli-

tional" movements utilize the spinal reflex mechanisms or not? How difficult it is to answer this question I have discussed in detail on another occasion.[17] I want to mention today only a few considerations in respect to this question. It has been well known for nearly 100 years that electrical stimulation of the precentral gyrus of the cerebrum causes well coordinated limb movements on the opposite body side. These movements were ascribed to impulses passing directly from the cortex through the pyramidal tracts to the anterior horn cells responsible for the observed movement. It is being recognized more and more that the relation between cerebrum and spinal cord is much more complicated. There exists besides the primary motor areas of Fritsch and Hitzig secondary and even tertiary motor areas in other gyri from which also more or less well coordinated limb movements can be elicited by localized electrical stimulation.[18] Of much interest for our present discussion is the now well established fact that cortically elicited joint movements are influenced exactly in the same way as discussed for spinal reflexes by the position of the activated limb, and even to a smaller extent by position of other limbs. In other words, the movement resulting from cortical stimuli is also distinctly dependent on the afferent impulse pattern reaching the spinal cord.[19]

In connection with the stimulation of the precentral gyrus, it should be pointed out that the old view that the pyramidal tract is involved solely in volitional activities, whereas the extrapyramidal tracts are involved solely in posture and tonus regulation, cannot be maintained any longer. More and more the idea is preferred, since supported by a variety of evidence, that both the pyramidal and the extrapyramidal system are involved in all activities under cerebral control, and that the balance between the functional state of these two systems is more important for normal "purposive" movements than the complete functional integrity of any one of these two systems.

We believe more and more that the cortical motor system does not by-pass the reflex mechanisms in the spinal cord. It is well established by now that pyramidal and extrapyramidal fibers have their terminal knobs not only on the anterior horn cells as assumed for a long time; the vast majority of the endknobs (95 per cent or even more) are found on internuncial cells.[20] There are no indications that there exist separate internuncial pools for "purposive" and for "reflex" activity.

Transactional viewpoint of CNS activity

A new concept of the organization of the CNS, often called the "transactional viewpoint of CNS activity," has been developed during the last decades.[21] The general organization of the CNS is the same from the spinal cord through the medulla, diencephalon and cerebral cortex, and even for the cerebellum. Each part has the same four functional components: sensory or perceptory system, efferent motor system, efferent γ system, and the connecting "neuropil" (corresponding to internuncial pool in spinal cord) with its polysynaptic diffusion. In each part of the CNS arriving perceptory impulses activate through the neuropil according to the pattern of reception, the configuration of the impulse outflow through the motor system determining muscle activity and of the impulse outflow through the γ system changing peripheral proprioceptor sensitivity. Since the latter alters proprioceptor inflow, a constant check and balance between central and peripheral mechanism is maintained. The transaction at higher levels of the CNS modifies, but does not abolish the results brought about by transaction at lower levels. Two different types of studies are mainly responsible for the development of the transactional viewpoint. It was observed that the older, ontogenetically, a vertebrate species is, the more primitive is its motor behavior, and the less variability will be shown by this behavior. There is progressive development from the simple fish movements through amphibian- and turtle-like movement to the true mammal-like movement, which finally reaches its greatest complexity and variability with the primates.[22] Corresponding to this movement development, the CNS of these species show more and more parts added rostrally, and the neuron structure of the parts becomes more and more complicated, especially that of the more rostral parts. The other type of study revealed that during embryological development of the CNS of the higher species, we found, in accord with a general biological rule, the ontogenetic development repeated. Each type of motor behavior which can be elicited from the fetus, the newborn or the young, corresponds more or less to the development and maturity the various neural structures have reached at that state.[23]

We have discussed the simple myotatic reflexes as formed by the spinal cord alone. But midbrain transactions, due to incoming vestibular impulses mainly, modify and enlarge the myotatic mechanisms. Still finer control and modification

posture and related functions is due to transaction in the by-passes represented by the cerebellum. Transaction in the basal ganglia and in the thalamus elevates the more reflex-like activity of the lower parts of the CNS to primitive movements in man and even to "natural" movements in lower mammals. Cerebral cortex transaction is needed in man and primates for initiation and control of truly volitional movements by utilizing mainly, but not exclusively, afferent impulses from eye and ear.

It must be kept in mind that transaction in higher CNS parts does not only alter motor outflow impulses but also γ fiber outflow, which in turn by changing peripheral stretch reflex sensitivity alters transaction at lower levels. Granit [24] even discusses the possibility that so-called "volitional" movements are initiated mainly by cortical activity causing only an increased localized γ outflow, which makes this part of the periphery so stretch-sensitive that the tension exerted by the antagonists can now initiate a movement by eliciting a stretch reflex in the agonist.

Primitive responses—normal and pathological

It is generally recognized that the modifying action caused by transaction at higher level upon transaction at lower levels is often of an inhibitory nature. Therefore, in the intact normal animal, many reflex-like activities caused only by transaction at lower levels are often not easily demonstrable. Especially cortical transaction can suppress and inhibit unconsciously transaction phenomena at lower levels. This cortical suppression is not very marked for transaction of vestibular influences at the midbrain level, but is very distinct for the so-called "tonic neck reflexes" due to transaction at about the same level. Therefore tonic neck reflexes are regularly demonstrable only in decerebrated animals or in patients with more or less comparable lesions.

Neck reflexes occur for no other reason than that stretch of a neck muscle [8] and movements in the joints of the neck vertebrae [25] elicit stretch reflex response not only in this particular muscle, but also cause reflexly a considerable change in innervation in other muscle groups. Thus, passively turning the head of a decerebrated animal or of a comparable patient from the midline to the left causes extension of the left limbs and flexion of the right limbs. Turning the head back to the midline reestablishes normal tonus distribution, whereas turning it from the midline to the right has just the opposite effect from turning to the left.

There is no doubt that in lower mammals the tonic neck reflexes are utilized to a large extent for the execution of natural movements. Thus "righting" is due more or less to the following chain of events: 1) head position is corrected by vestibular reflexes; 2) neck reflexes elicited by the head movement correct shoulder and pelvis position; and 3) muscles stretched due to corrected shoulder and pelvis position bring about reflexly the needed tonus distribution in the limb muscles for correct upright position.

In decorticated dogs and cats regularly, and in normal dogs and cats occasionally, when they are absent-minded (not suppressing lower level transaction by cortical transaction), a passive lifting of the head of the standing animal will cause it to sit down on its hind legs. According to Magnus [5] the passive head lifting elicits a chain of reflexes according to the following scheme: head lifting → curvature of cerebral vertebrae → forward movement of pelvis → forward movement of shoulders → flexion in hind limbs and increased extensor tonus in forelimbs.

In normal human newborns, since the cerebral cortex is not yet matured, the effect of these tonic neck reflexes on the position of the limbs can be regularly demonstrated. There also exist reflexes from the shoulder muscles affecting pelvis and hindlimb position as well as reflexes from the pelvis muscles affecting shoulder and arm position.[26] Apparently all these reflexes are part of a primitive crawling mechanism. Even in some normal adults, position of the head can influence to a certain extent tonus distribution in posture [27] and quickness of motor reaction.[28]

In patients with certain higher parts of the CNS damaged, these neck and related reflexes are often easily demonstrable. There are certain patients, apparently with limited damages, in which such reflexes can be demonstrated only under specific conditions causing reflex reenforcement. Such a patient has been described in detail by Simons [29] A hemiplegic with complete volitional paralysis of the left side of the body showed tonic neck reflexes acting on the paralytic limbs only if the patient exerted nearly maximal volitional effort with his right hand by gripping a wooden block.

In this type of patient, provided the paralytic limbs are not too spastic, the neck reflexes can be utilized to reestablish awareness of muscle activity as a first step in retraining muscle coordination. Often in such patients no true normal volitional movements will be reestablished, but pseudovolitional movements of a more primitive type, due mainly to basal ganglia and thala-

mus transaction, can be developed. However, such primitive movements can be of utmost value for the patients as shown by Brunnstrom.[30]

Related to pathological neck reflexes and to the more primitive patterns of movements are the occurrence of so-called "associated" movements. By this is meant that with maximal efforts directed specifically to activate a given muscle group, other muscle groups also become activated, and the person in question cannot suppress this unwanted activation. There is much evidence that most pathological associated movements are the expression of missing cortical transaction, so that the more primitive movement patterns of the lower transaction prevails.[31] On the other hand, it is well known that many normal persons demonstrate a variable number of distinct associated movements. Most normal persons, some more easily than others, can learn to lose at least some of their associated movements by repeated exercise with emphasis upon the awareness for the task required.[32] Since the ability to dissociate associated movements in normals is so variable, we have not to wonder at all why our success in suppressing associated movements in patients is often so unpredictable.

The principle of associated movements can be utilized like tonic neck reflexes to teach a patient muscle awareness for a volitionally paralyzed muscle and finally reestablish volitional control. However, this again is only possible with patients with limited increase of tonus or spasticity.

In patients with highly increased tonus or spasticity, the latter must be at first considerably diminished before any method of reeducation can be really successful, since otherwise any attempt towards volitional control will mostly increase spasticity to a large extent. You will hear later various methods, explained and demonstrated by Miss Rood, Miss Knott and Mrs. Bobath, suitable to reduce spasticity in various types of patients as a preliminary step for reeducation. Time does not permit discussion in detail of the physiological rationale for each of these various technics proposed. However, all the basic physiological principles involved have been mentioned in this paper. I only want to point out that the methods of Rood as well as of Knott use to a large extent various specific peripheral stimulations provoking, according to need and choice, either increased activity or increased inhibition of the anterior horn cells of the muscle to be treated. The Bobath methods [33] specifically proposed for patients with cerebral palsy utilize mainly, but not exclusively, the finding of Magnus: [8] 1) that with symmetrically relaxed head flexors, tonic neck reflexes are at a minimum; 2) that weight bearing of limbs increases postural tonus, and 3) that the head position maintained in Bobath's methods corresponds to the head position in which the vestibular influence upon tonus in general is at a minimum.

Cerebellar disturbances

A few remarks should be made concerning disturbances due to damage of the cerebellum. It was mentioned before that afferent as well as effert by-passes through the cerebellum connect lower parts with higher parts of the CNS and vice versa respectively. The neuropil of the cerebellum permits important transactions there to both the motor and the γ system,[34] adding finer regulations to volitional movement and posture. In consequence, cerebellar damage can cause, mainly because of a lacking of a "braking action" of once initiated muscular activity, typical disturbances such as: rebound, intention tremor, dysmetria, dysarthria, and cerebral ataxia. Such patients can often be helped by exercises increasing utilization of cortical mechanisms of proprioceptor and skin perception. Patients with more dysdiadokinetic symptoms profit by resistance during rhythmic stabilization and other exercises introduced by Kabat.[35]

Any type of reeducation in patients as well as learning of new motor skill by normal persons is only possible due to a general neurophysiological principle not yet mentioned. The use or disuse of a synapse repeatedly enforced by specific neurophysiological conditions of temporary facilitation or inhibition leads finally to a permanent facilitation or permanent inhibition for later passage of impulses through the synapse in question. This principle is well established as a fact, as you all know from your daily experience, but as to the underlying mechanism only speculations are possible at present.[36]

Finally, I wish to remind you and challenge you by saying that any method of reeducation or therapeutic exercises will be effective in direct proportion to 1) the extent of its neurophysiological basis and 2) how good a transference you can establish between you and the patient. You as physical therapists have the obligation to assess your therapeutical measures in terms of neurophysiology and to evaluate and to satisfy as far as possible the psychological needs of the patients.

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Proprioceptive Neuromuscular Facilitation Film

A 35 minute color film with sound is available to chapters and schools of physical therapy at a rental fee of $10.00. One copy of the film has been given to the Association by the California Rehabilitation Center. Requests from states east of the Mississippi should be directed to the American Physical Therapy Association, 1790 Broadway, New York 19, New York; rental is payable to the American Physical Therapy Association. Those west of the Mississippi should write to California Rehabilitation Center, 2600 Alameda, Vallejo, California; rental is payable to the California Rehabilitation Center. All requests should be submitted two weeks in advance of date of showing. Alternate dates are desirable since both copies may have prior bookings.

The Development of Motor Control for Walking in One Hundred Cerebral Palsied Children

Gladwynn P. Salway, M.A.

This investigation deals with the development of motor abilities in cerebral palsied children which lead to walking. It is based on a survey of motor abilities present in 100 children of school age, including tests for head balance, sitting balance, creeping, standing, and walking.

The ability to walk is commonly the primary aim towards which physical therapy is directed in cerebral palsy treatment. Progress in mastering the necessary steps in motor control is often slow and laborious, and at times the child's attempts to walk continue to prove fruitless. Physicians and physical therapists must consider means for teaching locomotion as effectively as possible. Observations on the developmental motor processes in cerebral palsied children should be of value in the planning of rational and practical programs of treatment.

Literature relating to the development of locomotion in cerebral palsy is limited. Lord [1] followed the progress in learning to walk made by 50 children between the ages of early childhood and 12 years. Thirty-seven could walk by the age of 12 years. Of this number all but 6 had been able to walk by the time they were 6 years old, and of the 6 who could not yet walk, all had attained standing balance by the time they were 6 years old. In a later study, Lord followed the pattern of development of locomotion in 300 children and concluded that those children who did not walk by the age of 6 had little chance of ever walking.

Hipps [2] followed and reported upon the progress of motor development in 49 severely involved cerebral palsied children for 6 years. During this period he utilized a chair brace in treatment which was designed to control the position of the head. These children were so extensively involved that at the outset none could hold up his head, balance it or control its movement, nor could any sit alone, stand, walk, or use his hands. Most of these children had received physical therapy in the form of reciprocation movements, sing-song conditioning movements, and relaxation training. Some wore braces. Hipps found that during the period of observation 96 per cent of the children learned head balance, 93 per cent learned to sit alone, 89 per cent learned to walk with assistance, and 27 per cent learned to walk independently. Findings indicated further that the average length of time required for the learning of head balance was 10.5 months regardless of the chronological age; the average time for the learning of sitting balance was 11.4 months after head balance had been achieved.

Hipps' findings were said to demonstrate that head balance precedes sitting balance and that activities requiring more complicated control, such as standing, may be accomplished only after head balance and sitting balance are obtained. Also, use of the hands did not develop until sitting balance was under control. This developmental pattern is similar to the normal sequence of motor activities, which suggested to Hipps that the treatment of cerebral palsied children should follow the same progression as developmental steps in the normal child:

> "To attempt to teach the patient to walk when he cannot sit alone or balance his head is foolish. It simply can't be done. A child must first learn to hold his head up before he can sit alone. He must learn to sit alone before he can stand alone, and he must be able to stand alone before he can learn to walk."

Among others who have investigated stance

Physical Therapist, California Elks Major Project, Inc., working with cerebral palsied children in the Indio-Palm Springs area.

This paper is an abstract of a thesis submitted to Division of Physical Therapy, Stanford University, in partial fulfillment of requirements for a master's degree, 1958.

ility and/or locomotion in cerebral palsy are elps (1938),[3] Pusitz (1938),[4] Egel (1948),[5] Whipple (1952),[6] Scherb (1927),[7] Houtz, et al. (1952),[8] and Spencer (1957).[9]

METHOD

In this study 100 children with cerebral palsy between the ages of 4 and 16 years were observed. These children were attending five publicly supported special schools in the San Francisco Bay area. With the exception of a few cases in which the diagnosis indicated the possibility of a progressive disorder, all children in attendance at each school were included in the survey. There were no limitations in relation to age, sex, type or extent of disability, or the type of treatment previously received. At each school where the tests were conducted the children came for examination at their usual time of treatment, which was most often in the morning. The tests were given in the room in which the child was usually treated. Care was taken to keep the environment as free from noise as possible. While the child was being examined his therapist was requested to be present to give him confidence and reassurance. The therapist's knowledge of the child's abilities served as a check on the validity of the test results. When the performance was questionable, the test was repeated after a brief time.

The motor abilities were investigated in the following sequence: head balance, sitting balance, creeping, standing, and walking. This order was chosen because it was believed to represent a gradation of performance from simple to more difficult, and to correspond to the developmental sequences in the normal child as described by Gesell[10] and McGraw.[11] Tests for head balance were done first in prone and supine positions because it was noted that unless the child could control his head against gravity in these positions, he could not balance it adequately in upright positions. In subsequent upright test positions, head control was noted for the purpose of determining whether or not the child had sufficient control over tonic neck reflexes so that his body was not thrown off balance by head movements.

CRITERIA FOR THE INDIVIDUAL TESTS

1. *Head balance*

The test for head balance required control of the head in prone, in supine and in upright positions. First, the child was placed in a prone position on a table with his arms at his sides and his head supported on the table in the midline. He was then asked to raise his head off the table until his face was vertical. He was asked next to turn his head through a range of approximately 180 degrees, and to move it forward and backward. In the supine position he was again asked to raise his head off the table and to turn it as he did before. Balance in the upright posture was tested by placing the child in a sitting position and giving such support as was necessary for maintaining an erect posture. Movements of the head were tested as before. In all tests for head movements the child was asked to look at a pencil and follow it with his eyes and head.

2. *Sitting balance*

The child was asked to sit erect with his legs over the edge of a table or to sit on a stool with his head in the midline. The hands were at the side but not supporting the body. A stool was used except in those cases where pressure of the feet on the floor caused reflex extension of the body. The subject was given slight pushes to see how secure he was in this position. Head movements were tested as described previously. If the movements of his head or the pushing did not cause him to lose his balance, his performance was rated *plus*. The sitting posture requested of the child would ideally require an angle of 90 degrees at the hip joint, with the spine erect and vertical. However, since balance was the primary consideration, mild deviations were allowed as long as the face remained vertical and the trunk balance was sustained.

3. *Creeping*

The ability to creep presupposes the ability to maintain balance in a quadruped position. Accordingly, the child was first asked to assume a position on his hands and knees or was so placed with the trunk perpendicular to the thighs. To test the control of this posture, he was asked to turn his head to either side and move it upward and downward in flexion and extension. The child was then asked to creep a distance of about 20 feet on a mat, moving the arms and legs in a reciprocal manner. Support on open palms was not required.

4. *Standing*

The child was asked to maintain a standing position with his head in the midline, his arms at his sides, his weight equally distributed on both feet and with his knees, hips, and back straight. Allowance was made for fixed contractures in hips, knees, and ankles which pre-

vented ideal alinement. As before, slight pushes were given to test the security of balance in this position. Movements of the head were requested as described previously to test further the subject's stability.

5. *Walking*

The child was asked to walk a distance of 20 feet without support of any kind including braces. Requirements for walking were:

a. Ability to maintain an erect posture within the limits of fixed deformities.

b. Ability to maintain a reasonably even rhythm of alternating movements at functional speed.

"Functional" was interpreted to mean that the child could walk fast enough so that his walking was useful to him in his everyday activities. Deviations from normal walking patterns were noted but were allowed if they did not interfere with the above criteria.

RESULTS

In the sample of 70 boys and 30 girls, it was found that over one third of the group (39) were able to pass the walking ability test. About half (49) could accomplish one or more of the remaining tests successfully, whereas 12 children were unable to perform any of the activities tested.

The distribution of ages was as follows:

Age in years	Number of children	Age in years	Number of children
4	7	10	7
5	21	11	2
6	9	12	5
7	10	13	6
8	12	14	6
9	12	15	1
		16	2

Approximately seven tenths of the group (71) were under 10 years of age. A majority of the children (59) were diagnosed as having spasticity; 28 had athetosis. Three were ataxic, 2 were diagnosed as having rigidity, while 8 had both spasticity and rigidity.

A summary of motor abilities present in the entire group is shown in figure 1. The number of successful performances in each category was related to the degree of difficulty of the five tests as graded from simple to difficult; that is, head balance was most frequently present, while walking was found least frequently. It may be noted that there was a difference of only 10.5 per cent between the total number who had head balance

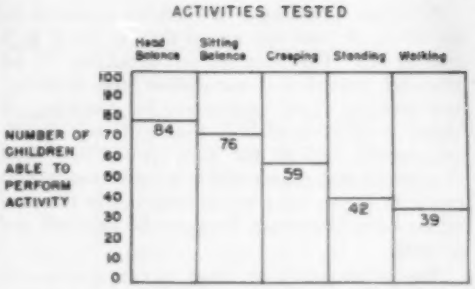

Figure 1. Distribution of motor abilities of 100 children with cerebral palsy, showing total number in each category.

and the total number with the ability to sit independently; the total numbers of children with standing and with walking ability differed by only 7 per cent.

Table 1 summarizes abilities in terms of individual subjects. The upper section of the table shows the number who conformed to the usual pattern; that is, activities which are considered to be basic to the more advanced abilities were present in each case in a series of steps of graded complexity. Exceptions to this pattern, which were present in 8 cases, are shown in the lower section of table 1. Here more complex abilities were present in the absence of simpler ones which normally precede them in motor development. These persons will be discussed later on.

Group who had achieved ability to walk

As mentioned previously, 39 subjects were able to demonstrate walking successfully as defined for this study. The ages of this group ranged from 4 to 14 years, with approximately two thirds of the number under 10 years of age. Twenty-nine boys and 10 girls were represented, and all types of diagnoses were included.

	Category	*Total Number in Category*	*Number in Category Who Could Walk*	*Percentage Ratio*
Age	4 to 9 yrs.	71	24	33.8
	10 to 16 yrs.	29	15	51.7
Sex	Male	70	29	41.4
	Female	30	10	33.3
Diagnosis	Spasticity	59	24	42.4
	Athetosis	28	11	39.2
	Ataxia	3	2	66.6
	Rigidity	2	1	50.0
	Combined spasticity and athetosis	8	1	12.5

higher percentage of walkers appeared in 10 to 16 year age group than in the 4 to 9 ar group. This may be accounted for by an xtended period for maturation and learning, nd perhaps more opportunity for training. A higher proportion of boys than girls could walk successfully. About the same percentage ratio of athetoid and spastic children could walk. Percentages do not have much meaning in the case of the other diagnoses because the numbers are so small.

The relationship of other motor abilities to walking is shown in table 1. Everyone in the group who walked successfully had achieved head balance and sitting balance; one was unable to creep and another was unable to demonstrate standing balance. A 10 year old athetoid boy was rated *minus* in creeping because he was not able to control his head while creeping. Although he moved his hands and feet in a reciprocal manner, he showed mild jerking movements. Extraneous head movements were present in standing positions as well as in walking, but he was able to bring his head to and away from the midline. The combination of controlling his head against gravity and making the associated movements of progression, as required in creeping, proved to be too difficult although either could be accomplished alone. A 10 year old girl, also an athetoid patient, could walk but could not stand. Her standing ability was rated *minus* because she could not maintain a standing position when pushed. She stood with a marked kyphosis and a forward head which may have contributed to her postural instability.

All of the group who successfully accomplished the test for walking reported that they were walking at home independently and were able to feed themselves unassisted. All of them had used or were using braces and had received some form of physical therapy; however, the duration of the previous treatment could not be ascertained with any degree of accuracy.

Group who had achieved ability to stand

Forty-two subjects could stand. All of them had head balance and sitting balance and all but 3 could creep. All but 4, who walked with assistive devices, passed the test for walking. The failure of 3 of these children to creep could be attributed to various problems. A spastic hemiplegic girl could not use her hemiplegic arm for support in order to creep although she had no difficulty in standing. A 4 year old athetoid boy who could stand but could not creep could not release his right arm from extension after using it for support. He was able to walk well on his knees and this method of locomotion was used in getting about. The 10 year old athetoid patient who could stand and walk but who failed the creeping test because of his precarious head control has been described in the previous section.

Group who had achieved ability to creep

Fifty-nine children could creep and all of these had sitting balance and head balance. Thirty-eight passed the walking test although 54 reported they were walking at home (13 with braces).

Group who had achieved ability to sit

Seventy-six subjects had sitting balance and all but 4 of these had head balance. Fifty-three were reported to be walking at home without braces and 9 with braces. Of the 4 *minus* ratings in head balance among this group, 3 failures were based on inability to raise the head when the subject was in the supine position. A 7 year old spastic boy was unable to lift his head apparently because of weak neck flexor muscles. Although this boy passed the sitting test, his head tended to fall backward and to the side when he was pushed. A 10 year old athetoid girl had the same difficulty. A 9 year old athetoid girl who could not lift her head from the supine position had only momentary control of excessive movements of the head in the sitting position. One child with combined spasticity and athetosis was rated *minus* in head balance because he was not able to control his head when he tried to turn to the side in an upright position.

Group who had achieved ability to control the head

Eighty-four children had head balance. Of this number, 73 could sit, 59 could creep, 42 could stand, and 39 could walk according to the requirements of this study. Twenty-one reported that they were walking at home with the aid of braces and 41 walked at home without support.

Group who had not achieved head balance

Sixteen subjects did not have head balance (13 athetoid, 3 spastic). With the exception of 4 children in this group who had sitting balance, none could pass any other test. (These 4 have been discussed with the group who had sitting

TABLE 1.

	Head Balance	Sitting Balance	Creeping	Standing Balance	Walking	Number of Children
Group in which	no	no	no	no	no	12
abilities present	yes	no	no	no	no	12
corresponded to	yes	yes	no	no	no	10
the normal	yes	yes	yes	no	no	19
developmental	yes	yes	yes	yes	no	2
sequence	yes	yes	yes	yes	yes	37
					TOTAL	92
Children whose	no	yes	no	no	no	4
abilities did not	yes	yes	no	yes	no	2
follow the normal	yes	yes	no	yes	yes	1
developmental sequence	yes	yes	yes	no	yes	1
					TOTAL	8
				GRAND	TOTAL	100

balance). Among the athetoid subjects 8 had control of the head in the prone position while the remainder could not control the head in any of the test positions. The spastic children could not elevate and control the head in a prone position because of exaggerated neck flexor muscle tension.

Relation of basic motor abilities to feeding and locomotion

Further relationships were noted between the motor abilities tested and the ability of the children to feed themselves and to walk at home. Of the 12 subjects who were not able to perform any of the activities tested, 2 reported they were feeding themselves but none was walking at home. Thirty-seven subjects who passed all the tests were walking at home and were able to feed themselves. The data indicate that, as might be expected, self feeding and functional walking were found more frequently as a greater number of the test activities could be performed successfully. Although the information regarding home activities which was obtained from the patient was checked with his therapist, its validity may be open to question as the performance of these activities could not be observed at first hand.

DISCUSSION

In the group of children studied, the distribution of motor abilities suggests the sequence of development observed in normal maturation in which the order of progression begins with head balance and proceeds to sitting balance, creeping, standing, and finally to walking. This increasing difficulty in activities was reflected in the decreasing number who could perform the advanced tests. With few exceptions, children who could perform advanced activities could also perform the simpler ones which normally precede them in normal motor development.

ety-two of the group conformed to this pat-n, while in only eight instances an advanced ctivity was present in the absence of a simpler one.

The incidence of standing balance and walking ability in the group studied appeared to be closely related, as only 4 who had achieved standing balance could not walk. In normal development there is a definite time interval between independent standing and walking, denoting that during this period posture and progression are not yet integrated.[10]

That the activity of creeping is an essential step in development of locomotion would appear to be indicated in this study by the fact that only 1 child who could walk failed the creeping test. Analysis of this failure indicated that the child had the basic pattern of leg reciprocation for creeping but was thrown off balance by extraneous head movements. Although all the subjects who could creep had head balance and sitting balance, and none without head balance or sitting balance could creep, there were 17 who had mastered the preliminary abilities and yet could not creep. This indicated that further postural controls must be developed between these two stages. In normal children, sitting is perfected by the age of 8 months and creeping by 1 year, when standing balance begins to appear.[11]

On the basis of the tests given, sitting balance was accompanied by head balance in all but 4 of the 76 children who could sit. However, in the interpretation of these figures the extent of the requirements for this test should be considered. Three of the 4 who failed did so because they could not raise the head in the supine position. The fourth could not control his head and turn it to the side in the upright position. If only support and balance of the head in the upright position had been required, all of the children who could sit could have passed the test for head balance also. This close relationship between the ability to balance the head and to sit independently would appear to justify the emphasis placed upon this step in training by such workers as Hipps, Egel,[5] and Bobath.[12, 13] Of the 24 children without sitting balance, half could control head balance. According to Gesell,[10] head balance is steady in supported sitting at 5 months. At 8 months the child lifts his head from supine lying in an attempt to sit up, and he sits erect unsteadily at this time for 1 minute. At 9 months he sits erect and steady for 10 minutes, and at 10 months he can sit indefinitely with secure balance. Thus head balance and sitting balance are achieved at 5 months and 10 months respectively. Findings in Hipps' group of severely involved patients paralleled this in that the interval between achievement of head balance and of sitting balance was about equal to the time initially required to learn head balance.[2]

In the present study a higher proportion of spastic children than athetoid could pass the simpler tests such as head balance, whereas the percentage in the two groups who could walk successfully was about the same (spastics, 41 per cent; athetoids, 39 per cent). This discrepancy might be explained by the fact that athetoid children have intermittent periods of normal muscle tone. This enables them to experience normal movements and thus to learn advanced activities such as walking. In spastics, on the other hand, the abnormal muscle tone and posture are more persistent and limit the opportunities for learning.

If it may be assumed from clinical evidence that the development of neuromotor mechanisms in children with cerebral palsy follows basically the "normal" sequence as described by Gesell and others, certain implications for treatment are apparent. On the assumption that the learning of a more simple activity improves the possibilities of mastering the next step in the neuromuscular sequence of development, the treatment in cerebral palsy should be directed first toward attaining the basic abilities. This approach provides a well defined goal toward which the child, the treatment team, and the family may work. An outline of procedures may be based on this concept.

Achievement of head balance should be the first objective. Treatment procedures should accordingly afford practice in head control in prone, supine, and supported sitting positions. Since there is normally an overlapping in the learning of successive activities, the subsequent activity in the series should be introduced while the former one is being perfected. Thus at this stage, training in sitting balance should be started while the child is learning head balance. As the child is perfecting his equilibrium in sitting, balance on hands and knees may be introduced. Since the child cannot be expected to move until he has some postural security, creeping should follow mastery of balance on hands and knees, and walking should be delayed until standing balance is secured.

The various activities leading to upright locomotion are largely automatic in nature. Righting reflexes are responsible for enabling the individual to lift the head, turn over, and get up (Bobath,[13, 14]). The equilibrium responses come

into play in each position to help the child adjust to gravitational stimuli (Weiz[15]). Accordingly, treatment procedures which elicit righting reflexes and equilibrium responses might be expected to accomplish more in developing upright locomotion than would deliberate and localized exercise movements which do not make use of the over-all coordinating neural mechanisms involved in postural control.

The time at which control of a new activity begins to appear is determined neither by the child's chronological age nor by his mental age, but by the stage he has reached in his neuromuscular development. Therefore, a physical therapist must be observant in noting the first signs of the appearance of a new ability. As the child is most likely to develop this activity at the time it first appears, optimum conditions should be provided immediately for its development.[11]

Following a treatment pattern designed to help the child learn motor control one step at a time, not only follows the normal pattern of development but simplifies the objectives of therapy by permitting concentration on a well defined, immediate goal. Trying to teach many possibly unattainable activities at one time may be only confusing and frustrating for the child. Of course, many more observations will be required before basic problems in regard to the rationale and method of cerebral palsy treatment are resolved.

SUMMARY

1. Among the 100 children tested, in 92 instances the distribution of motor abilities suggested the normal sequence of motor development (i.e., achievement proceeds from head balance to sitting balance, creeping, standing, and finally to walking). In 8 cases more advanced abilities were present in the absence of simpler ones which normally precede them. Of the 8 atypical children, 4 were athetoid, 2 were spastic and 2 had combined athetoid and spastic characteristics.

2. All but 2 of those who could walk performed all the other tests successfully; only 4 children who were able to stand were unable to walk; 21 children who could creep could not walk.

3. Of the total number of subjects tested, 34 had head balance, 76 had sitting balance, 59 could creep successfully, 42 could stand, and 39 could walk within the definitions of this study.

4. Although a greater percentage of spastic than of athetoid children had basic control of head balance, sitting balance, and creeping, the percentage of the total who could stand and walk was very nearly the same in the two groups.

5. A larger proportion of children between the ages of 10 and 16 years had sitting balance, standing, and walking control than in the younger group. The percentage of the total number with head control and creeping was about the same in both age groups.

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An Experimental Study in the Neonatal Guinea Pig on a Possible Cause of Cerebral Palsy*

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Oversedation of the pregnant mother with barbiturates administered near term has been postulated as a possible causative factor in the etiology of cerebral palsy. This has been partially predicated upon the observation that experimentally induced hypoxia in utero, effected by clamping uterine arteries in the pregnant guinea pig near term, can lead to spastic paralysis and other neurological manifestations in the newborn young. The possibility exists that certain obstetrical drugs, and the barbiturates in particular, might well create adverse conditions in utero either by markedly depressing the fetal respiratory center directly or by interfering with the hemodynamics of blood flow across the placenta. The following experiment was performed to test such a hypothesis.

Method

Pregnant guinea pigs, 65 days of gestation (term in our colony averaged 66.5 days with a range of 64 to 72 days), were delivered in a constant temperature bath of Locke's solution. After local infiltration of the maternal abdomen with xylocaine, a control animal was delivered. Then, the mother was given Nembutal (sodium pentobarbital) by cardiac puncture. The dosage level given was either a light one (28 mgm./kilo.) or a heavy one (40 mgm./kilo.). Observations were made on the effect of the drug upon fetal behavior while the exposed, gravid uterus remained immersed in the water bath. The anesthetized experimental animals were delivered at time intervals varying from 1 to 5 minutes after cessation of fetal respiratory-like activity in utero, or 20 minutes after drug administration in those cases where no fetal respiratory-like efforts had been observed.

Results

The behavior of 17 water-bath, cesarean controls and of 16 normally born neonates was compared with that of 20 drugged neonates.

Table 1 shows that there were no fundamental differences between the two control groups in terms of birth weight, litter size, or survival over a three month's observation period. The slight birth-weight advantage that the cesarean delivered group seems to have is entirely within the realm of sampling error. Variation about mean birth-weight values was large in both groups.

Behaviorally the two control groups were also alike in that no animal in either group exhibited symptoms of neural damage. This was in marked contrast to the findings in the drugged deliveries.

Table 2 compares the cesarean delivered experimental animals with their own littermate controls. It also compares the lightly and heavily anesthetized groups with each other. While the experimental animals were actually heavier on the average at birth, they failed to recover their birth weight as rapidly as the controls during the first weeks of life.

Total exposure time to the anesthetic drug in utero varied from litter to litter but averaged 8.5 minutes for the lightly anesthetized group and 11.6 minutes for the heavy dose group. Exposure times to Nembutal were not kept equal as it was our practice to deliver fetuses after the last intrauterine gasp, and when animals failed to exhibit early respiratory-like behavior in utero, we delayed delivery somewhat to allow for the possible late onset of such activity.

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This study was supported by grants-in-aid from the Gustavus and Louise Pfeiffer Research Foundation and from United Cerebral Palsy, Inc.

* Presented at the Annual Conference of the American Physical Therapy Association, Seattle, June, 1958.

TABLE 1. *Control Groups*

Data	Cesarean Controls (Littermate Controls)	Normal Births
No. Controls Studied	17	16
Avg. Litter Size	2.6	2.3
Sex	M 5 F 12	M 8 F 8
Avg. Birth Weight (grams)	M 88.0 F 83.0 > 85.0	M 81.9 F 76.4 > 79.1
Survival	12 3 months* 5 < 1 week	12 3 months* 4 < 1 week

* Length of observation period.

Fetal, intrauterine, respiratory-like efforts were clearly noted in 54 per cent of the lightly anesthetized animals and in 86 per cent of the heavily anesthetized ones. Its duration was approximately 4½ minutes regardless of the dosage level employed. The rhythmic nature of these thoracic cage excursions, sometimes shallow, sometimes deep and accompanied by gasp-like mouth opening, could not be confused with other forms of fetal motility. Seven of the drugged fetuses failed to exhibit this type of behavior even after 20 minutes exposure to Nembutal. In other cases, it began within 10 minutes of drug administration.

Postnatal apnea ranged from ½ to 25 minutes in the drugged neonates. Seven of the lightly anesthetized group failed to breathe at once at birth, but only 3 of these required resuscitation. All of the heavily anesthetized animals were apneic at birth, and all required resuscitation in order to survive. Resuscitation was accomplished under positive pressure, with oxygen from a regulated cylinder led into the trachea via a hypodermic needle.

Table 3 lists 11 common findings encountered in drugged neonates during their recovery phase. None of these symptoms was observed in the control animals, but all drugged survivors exhibited one or more of them, some showing more symptomatology than others. Severity did not correlate with dosage level or with exposure time to Nembutal. Percentagewise, less symptomatology was observed in the lightly anesthetized group. Still, some animals in this group were afflicted with six or seven of these disturbances, or with as many in combination as were noted for the 3 worst affected in the heavily anesthetized group.

TABLE 2. *Cesarean Deliveries: Drugged vs. Control Groups*

Data	Light Dose Experimental	Light Dose Control	Heavy Dose Experimental	Heavy Dose Control
Dosage Nembutal (Mgm./Kilo.)	28	0	40	0
Drug Action Time (Min.)	8.5	0	11.6	0
No. Animals Delivered	13	12	7	5
Average No. per litter	2.65		1.75	
Average Birth Weight (Gms.)	88.6	85.6	84.7	80.5
Average Duration Intrauterine Respiration (Min.)	4.2 (in 54%)	0	4.9 (in 86%)	0
Average Duration Postnatal Apnea (Min.)	9.9 (in 54%)	0.05 (in 15%)	8.8 (in 100%)	0
No. Requiring Resuscitation	3	0	7	0

Although atonia and cyanosis at birth were common findings, nevertheless, certain animals exhibited remarkable tone at birth and breathed at once. One felt recovery should be as uneventful as in the the case of the littermate controls; yet, two to three hours later they showed symptoms as severe as some of the atonic, apneic animals which had required resuscitation. Good muscular tone and the establishment of spontaneous respiration at birth in no way guaranteed an uneventful recovery.

TABLE 3. *Frequency of Neurologic Sequelae in Neonate's Drugged During Delivery*

Finding	Light Dose 28 Mgm./ Kilo.	Heavy Dose 40 Mgm. Kilo.
No. Animals Delivered	13	7
Atonia and Cyanosis at Birth	7 (54%)	7 (100%)
Delayed Righting	9 (69%)	7 (100%)
Spastic Limbs	5 (39%)	4 (57%)
Head and Trunk Tremors	7 (54%)	7 (100%)
Incoordinate Gait	6 (46%)	4 (57%)
Alternate Running Movements	4 (31%)	2 (29%)
Failure to Walk	2 (15%)	3 (43%)
Loss of Startle Reflex	4 (31%)	3 (43%)
Feeding Problems	4 (31%)	3 (43%)
Piloerection	4 (31%)	2 (29%)
Forced Circling	1 (8%)	0

The majority of animals were delayed in righting efforts for at least three or four hours. The controls righted as soon as they were born. Head and trunk tremors were marked. More than one third of the drugged animals developed spastic limbs and opisthotonus. Before righting, spasticity was more pronounced in the forelimbs than the hind. With the advent of locomotor efforts, residual spasticity was greater in the hindlimbs resulting in awkward and incoordinate gaits. The animals walked stiff-legged with their hind quarters carried high. They stepped on their own feet and stumbled. Some failed to walk at all, in which case they died within the first week. One pitiful specimen propelled itself along with its forelimbs while its lower extremities dragged behind in rigid extension.

Spasticity often gave way to rapid, alternate, running behavior, with the animal lying on its side unable to right. These episodes of coordinate running appeared sporadically, and often lasted for 20 minutes or more leaving the animal completely exhausted.

Less frequent findings were: forced circling, loss of startle reflex, feeding difficulties because of cranial nerve paralysis to face, tongue, or pharynx. When inactive, many of the animals sat in peculiar hunched postures with the fur in marked piloerection.

Discussion

In an experiment of this sort, we can only theorize as to whether a state of hypoxia, hypercarbia, or both existed in utero after drug administration. There are certain observations that tend to support such a possibility, however:

1. Nembutal markedly depresses respiratory rate and minute volume in normally born neonates who are given a heavy dose of the drug shortly after birth. These animals develop the same neurological symptoms we have reported for our drugged deliveries. It would seem that the fetal respiratory center should not react much differently from that of the neonate.

2. If Nembutal depresses the respiratory center, why was it that we observed fetal respiratory-like efforts in utero? Shortly after drug administration we observed vasoconstriction and blanching of the uterine vessels near placental sites in the majority of our litters. Fetal respiratory efforts always followed. Vasoconstrictor activity could interfere with O_2-CO_2 transport between mother and fetus and thus serve as an activator of the fetal respiratory center. Vasoconstriction could also cut down on the amount of drug getting across to the fetus per unit of time. The delivered young were, always atonic and apneic. Perhaps this was due to a state of intrauterine hypoxia, or hypercarbia, or both and not to the depression of the respiratory center by the drug.

3. In *heavily* anesthetized litters where vasoconstrictor activity was *not* observed, the drug apparently passed readily to the fetus and depressed the respiratory center. There were *no* fetal respiratory efforts in utero, and again atonic and apneic young were delivered.

4. In *lightly* anesthetized litters where vasoconstriction did *not* occur, there was *no* mechanism to activate the fetal respiratory center nor was the drug concentration great enough, apparently, to depress it. There were *no* respiratory efforts in utero, but the young were delivered with good muscular tone and they breathed at once.

5. We do not know why vasoconstriction did not occur in all litters any more than we know why the drug should not have depressed the fetal respiratory center *completely* in all litters.

Conclusion

In the guinea pig with its highly developed nervous system at birth, oversedation of the mother near term with sodium pentobarbital can produce young showing many of the neurological characteristics attributed to the cerebral palsied child. Even mild sedation of the mother with this anesthetic drug was not without its dangers for the newborn.

While one hesitates to apply animal findings to the human sphere, there is a forceful implication that the misuse of barbiturates to insure an entirely painfree delivery may, inadvertently, be a potent factor to consider in the etiology of cerebral palsy.

Basis for Selection of Mobilization Technics

Harold Egli, B.S.

Upon review of the literature, one soon comes to realize that there is no unanimity of opinion in defining common medical terms such as adhesion, spasm, spasticity, rigidity, tightness, and abnormal stretch reflex. Many use these terms synonymously with the term contracture. Inasmuch as all of the terms mentioned may produce or precipitate limited range of motion of joints, one can readily visualize the close association to the term contracture. Though this paper will be limited to presenting and classifying technics for increasing joint mobility, a summary of the historical background of contracture and the technics for correcting these abnormalities are certainly indicated.

History

The clinical characteristics of contracture were first outlined by Richet [1] in 1881. In 1917, Cooper [2] reported a sound review of the subject. Since that time little has been added to our knowledge of the physiological background of contracture.

Many technics to prevent, counteract, and correct limited joint motion have been used empirically. Huppert and Kramer,[3] Kessler,[4] and Paul [5] all emphasize the importance of positioning to lessen the possibility of contracture during periods of disability. Jones and Lovett,[6] Watson-Jones,[7] and DePalma [8] do not recommend passive stretching but primarily advocate *active* exercises to prevent and/or increase joint function. DeLorme and Watkins [9] and Moseley [10] dwell upon the importance of resistive type exercises, the rationale being that increased joint mobility without concomitant strengthening can be just as deleterious as restricted joint mobility alone. Avignon and Avignon [11] have used a pulsating electrical current to aid in stretching procedures, the theory being that the current predominated over the painful sensation elicited in passive stretching and thus allowed a greater force to be applied.

This author [12] has previously written on a specific stretching technic via counterbalancing. Stano and Meislin [13] highly recommend the use of ultrasound prior to stretching because of its softening effect upon the tissues with an increase in the pain threshold. Snell,[14] in her work with cerebral palsy patients, outlines a program of conditioned reflex training and synkinetic motions which, by its inherent nature, increases joint function. In his research on experimentally produced peripheral nerve lesions, Sherman [15] has demonstrated that massage and passive range of motion have definite value in decreasing the severity of contractures, but do not alter significantly the rate of development. In regard to the various types of mechanical stretching devices, it is sufficient to state that there are probably as many as the reader so desires to investigate. Authors such as Krusen,[16] Phelps,[17] Schram, Bletcher, and Gonnella,[18] Morris,[19] and Kleinberg [20] extensively expound upon various types. Finally, at the opposite end of the swing of the pendulum, Bunnell [21] states that for severe contractures and cicatrices of the hand, physical therapy is useless. Certainly some of the preceding statements are taken out of context; nevertheless, they point up a major fact—that for most physicians and physical therapists, stretching technics are based primarily on empiricism.

A concise understanding of what contracture is (and is not), plus a logical classification of mobilizing technics should enable us to develop a sequence of treatment in which we attempt to mobilize a joint according to the disease entity or disabling factors.

Definition and Classification

According to Steindler,[22] contracture is a passive state of permanent muscle length which is different from the normal. Contractures can vary in type and degree depending on the tissue involved: *myogenetic*, affecting muscles and tendons; *capsular and periarticular*, affecting the joints; and *dermogenetic*, resulting in changes in the skin and subcutaneous tissue. Dr. Steindler also classifies contractures according to the "physical properties of muscle":

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Dynamic imbalance—The normal muscle equilibrium about a joint is overthrown, as seen in paralytic conditions (anterior poliomyelitis).

2. *Spastic*—Joint limitation is due to an innervational element; the muscles are under an innervational overload (cerebral palsy).
3. *Myositic*—Limitation of motion is due to intrinsic changes in the structure of the muscle itself (ischemic contracture).
4. *Combination spastic and myositic*—Reflex contracture as is seen in inflammatory joint conditions. In the early stages there is spasm (muscle splinting) due to pain, but in the course of time there is structural shortening (rheumatoid arthritis).

That consideration of these classifications be given in selecting the appropriate mobilizing technic in relation to the disease entity seems important and necessary.

Joint Mobility Factors

Prior to subjecting a patient to mobilization of any part of his body, it is imperative that a number of underlying and related factors be known, which in turn should determine the attack on the problem. Thus far this paper has intentionally elaborated upon limited joint motion without discussing causative factors. These factors must be known, inasmuch as a reduced and united fracture is handled differently from the restricted motion (contracture) of a severely burned hand. The fracture would more logically respond to *active* and *active resistive* exercises, whereas similar technics for the severely burned patient would undoubtedly prove futile. This example could be paralleled with many an analogy. One must be cognizant of the age of the patient; usually beginning in the third decade tendons lose their normal tensile strength. One must also be aware of conditions that restrict joint mobility but are not true contractures, such as reflex spasm of muscles supporting an inflamed joint or the reflex splinting of a fracture by surrounding musculature. In pyramidal tract injury producing hemiplegia, one should note the stereotyped pattern of muscle tone that ensues in the lower extremity, for example, external rotation with hip and knee flexion.[23] Other factors that must be known in order to choose a mobilizing technic that is desirable for a specific patient during a certain phase of his recovery are the degree to which osteoporosis may be present, whether there is limitation as the result of scarring adhesion or true contracture, whether a disease involves upper or lower motor neurones, and the specific joint or joints involved.

Technics For Increasing Joint Range of Motion

Just as in muscle strengthening procedures, stretching technics fall under five main headings: (1) passive, (2) active assistive, (3) active, (4) active resistive, and (5) functional.

Passive—In this mobilizing procedure the stretching force is applied independent of any active movement by the patient. It may be applied by such various mechanical units as braces, splints, and spring-loaded assistive devices. Proper positioning of a part so that gravity may induce stretch is often used. These means of increasing joint mobility discussed thus far all employ the three-point pressure system. A force in one direction, which may be thought of as the fulcrum, is counteracted upon by two forces in the opposite direction, one being on either side of the fulcrum. Other means of passive stretching often used are electrical stimulation, pulleys via counterbalancing, nociceptive stimulation to elicit or facilitate synkinetic movements, and skin or skeletal traction. The basic way of applying passive motion to a joint is by another person. There is much to be said in favor of this technic since the experienced person executing passive movement can alter the technic as other variable factors occur. For example, it has been the author's experience that a greater range of motion is achieved if traction is applied concurrently with passive movement in such problems as arthritis and bursitis.

Active assistive—By this procedure the patient is receiving assistance to execute the motion by means of a force other than the volitional contraction of muscles related to a specific joint. It is a fine line that separates many of the technics of mobilization from being categorized beneath a specific heading. Many of the technics presented under "Passive" could also apply under this heading by the qualification that the patient, through an intact nervous system, could volitionally assist the motion being produced in the involved joint. The two primary means in applying this technic are through the patient assisting the therapist to perform a specific movement and through a counterbalance system using a pulley arrangement.

Active—The motion produced in a joint is executed without the aid of outside forces. By the classification employed, it means that there is a functionally intact nervous system. This type of mobilizing exercise is most highly encouraged by the various authorities in the field of orthopedics.[6,7,8,10,21,24] The rationale is based on the

law of reciprocal innervation; voluntary contraction of a muscle is accompanied by the simultaneous relaxation of its antagonist.

Active resistive—Resistance may be offered by many means; the important thing is to choose the very best method. For example, an acute rheumatoid arthritic may prosper by progressive resistive exercises, which in turn stretch the antagonist of the functioning muscle but, generally speaking, they should be done in the nonweight-bearing position to lessen the likelihood of producing an inflammatory reaction in the joint. At times the effects of several mobilizing technics may be compounded. It is not uncommon to perform resistive mobilizing exercises in the gravity-assisting position. Thus the stretch is enhanced by a gravitational pull. It is also well to realize that through such a technic, the muscles are strengthened as the range of motion is achieved.

Functional—Functional exercises increase joint range of motion through general activity that does not have increased mobility as its only or primary objective. This is frequently accomplished during gait and self-care activities and by occupational therapy. In the home, general household duties provide functional exercise which may contribute to a gain in range of motion and function.

Discussion

It has been the author's intent to highlight the importance of selecting a mobilizing technic in relation to the disease entity or disabling factors. The endeavor has also been made to increase awareness of the desirability to classify the various technics under five basic headings. This not only permits the therapist a more specific selection of a treatment tool, but enables the supervising physician to prescribe, control, and measure quantitatively the results.

It is also most important to realize that sufficient clinical knowledge exists which, if applied, can do much to prevent severe complications of joint limitation. The basic preventative measures consist of passive and active movement through a full range of motion several times daily, control or elimination of such factors as pain and inflammation, and the maintenance of corrected body positions. If these preventative factors were kept in mind and practiced where indicated, complicating limitation of motion could frequently be avoided.

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Teaching a Blind Cerebral Palsied Child to Walk

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Yvonne is a 9 year old sightless cerebral palsied child of the spastic paraplegic type. She is left handed. At age 5 years, 10 months, her psychological test showed, "she was friendly, but her responses were poor, included much perseveration, and it was hard to hold her attention. Speech indistinct." On the Intermin Hayes-Benet scale for the blind her performance ranked her well below average in ability for school work.

At this age the child was sent to the Cerebral Palsy Center, but was unable to attend regularly because her family could not provide transportation for her. Reports from the C. P. Center stated that, "Yvonne is a happy, appealing and cooperative blind child whose arm and hand activities are limited by lack of vision. She sits well, creeps, but has no standing balance and needs complete assistance to walk."

Yvonne was enrolled at Condon School in September 1956. She wore bilateral control braces with pelvic band. The prescription requested walking and balance training with supplemental stretching of knee and hip structures and achilles tendon. The child was extremely apprehensive upon admission to the physical therapy department, crying if the therapist could not work with her immediately. She had no sense of balance or reciprocation for a walking pattern. She sat with her head drooped, arms flexed, and trunk relaxed.

Standing balance was practiced in standing tables while in the physical therapy department and the classroom. Walking sense was encouraged by manually moving Yvonne's lower extremities as she attempted walking between parallel bars and during use of "stabilizers." These stabilizers have supporting strap iron up to the knees and the child's feet are fastened to the base, but the feet are separated so the child can move them as skiis. The child feels the security of stabilizers and can at the same time simulate the walking pattern by the use of skiis.

It was found that Yvonne had no feeling of extension of her back, neck, or elbows. Standing and sitting tall and elbow extension exercises were emphasized. A spring steel back extension brace was incorporated with her leg braces. After several weeks a weighted chair was procured for the child to push. She constantly pulled it to her. After following this pattern of performance twice a week for four months, Yvonne grasped the sensation of pushing the chair ahead of her with straight elbows. In an attempt to make her independent of her physical therapist a wide supporting strap was fastened to the chair, at buttocks level, so that she could maintain the "pushing position."

In September, 1957, a second physical therapist found that the child habitually slumped while sitting, but she could sit tall and hold her head up if reminded to do so. Table exercises were again started for hip, knee, and elbow extension against resistance in the supine position. In prone position pushups to the hand-knee position were emphasized. This activity was extremely difficult for Yvonne to grasp. She could assume an elbow-knee position, but it was very difficult for her to proceed to bearing her weight upon her hands. She also stood beside the table and practiced pushing herself away. She did pushups in the walking bars.

In January, 1958, the Braille teacher said Yvonne needed more strength in her fingers and hands. Crutches were introduced to her, first by merely trying to get her to push and lift her body weight. Following this the physical therapist would swing the crutches forward then assist Yvonne to lift and push her body through in a small step. Gradually by May 1958, Yvonne is learning the feel of crutch position necessary for even support when she pushes her body through. She likes to hear the crutches tap the floor, and if complimented is apt to swing and push too vigorously. With concentration, she can now place her crutches correctly and use a swing-through gait for a distance of 300 feet. If disturbed by others, she easily loses the rhythm.

There is still much to be done to improve Yvonne's elbow and back extension. It is hoped that by the next school year she will have gained enough to begin work on the 4 point and 2 point crutch walking. Thus, with guidance, she will be able to move around limited areas independently.

Each year the mother is called in to Condon School to learn what Yvonne is doing so that she and the family can continue the work at home. They are interested and love their child, but have a large family.

This report has been compiled from the records of two physical therapists. Mrs. Doris B. Hall, the first year, and Ruth E. Pratt, the second. I feel that since this is a school and the classroom teacher is important to the child's program, Frances Stoelting can add comments of her work as follows:

"Yvonne entered the special class for cerebral palsied children at Condon School in September

Physical Therapist, Condon School, Cincinnati, Ohio.

of 1956. She liked to play with toys and manipulate materials, but she wanted a great deal of attention from the teacher, constantly asking 'Now what are you doing?'"

To prepare for Braille she was taught to discriminate between various materials, paper, cloth, leaves, nuts, buttons, and seeds as well as toys. At first she was presented with things that had gross difference then gradually finer and finer distinctions were required.

Concepts of up and down, right and left, under and over were strengthened. Number experiences were planned beginning with a concept of 2. Gradually it increased. The shapes of the circle, triangle and square were introduced and compared.

Meanwhile any plan Yvonne expressed was carried out cooperatively. She made houses, baskets, paper dolls, and books. Gradually she learned to use one hand assistively, often as the "watching" hand, as the other one reached for more material.

Cards with the Braille symbols enlarged were introduced much as a seeing child plays with ABC's. She found likeness and difference in these. Toward spring Yvonne was introduced to the Braille symbols. She was shown her name, the names of friends, a word for each beginning sound. Not only did she match them, she began to show she could recall them. In the last months of the year she could begin a pre-primer in Braille writing.

This year a special Braille teacher has come to give Yvonne assistance with reading. She will soon be ready to read a primer. Her progress is not rapid, but it seems to be steady.

She is still eager to work with her hands. She likes to be busy all the time, but she is less demanding of the teacher's attention. Now she can amuse herself for as long as 30 minutes at a time.

A Cerebral Palsied Child with a Secondary Cerebellar Tumor

Alex Geller, M.S.

Michael D. was first seen at the Cerebral Palsy Clinic of Long Island College Hospital, on Nov. 10, 1953, for diagnostic evaluation. At that time he was 19 months of age.

The history revealed that the child's birth was uneventful. He was a full term baby whose mother was in labor for 10 hours. Presentation was vertex and low forceps was employed. His birth weight was 6 pounds 14 ounces.

The maturation status was normal until about the tenth month when the parents noticed that the child would stiffen his legs in walking and that he appeared to have lost interest in his environment. The parents attributed this regression to a fall down a flight of stairs. After this the child became fearful and never tried to walk alone again.

The orthopedic examination of Nov. 10, 1953, showed that a mildly exaggerated stretch reflex was present in the wrist pronators, elbow flexors, and shoulder adductors bilaterally. Function appeared normal. The lower extremities showed a severely exaggerated stretch reflex in the heel cords and toe extensors. The knee extensors and hip adductors showed a moderately increased stretch reflex. He could not stand alone but with manual support he was able to stand in a position of marked equinus and back knee. The deep tendon reflexes were positive and clonus was elicited.

Senior Physical Therapist, Cerebral Palsy Clinic, Long Island College Hospital, Brooklyn, New York.

A diagnosis of spastic quadriplegia with maximal involvement of the lower extremities was given. Etiological factor was thought to have been the fall at 10 months of age.

Physical therapy was instituted twice weekly and consisted of therapeutic exercises for the knee flexors, hip abductors, and ankle dorsiflexors. Passive stretching of the heel cords was prescribed as well as reciprocal conditioning of the lower extremity movements.

A psychological examination in March, 1954, showed the child to be functioning at the lower level of the average range of intellectual development.

Progress in overcoming hyperactive stretch reflexes and in increasing strength was steady but slow. Early in June and throughout July, 1954, the child exhibited signs of petit mal seizures, (staring vacantly and falling asleep) during therapy sessions. He was examined by the pediatrician, who ordered an electroencephalogram but no definite signs of seizures were noted. Physical therapy was continued under observation. In October, 1954, the therapist noted that the child offered extreme resistance to movement, as though he were in pain, and there was a questionable enlargement of the skull. These observations were reported to the pediatrician who requested that X rays of the child's skull be made. In November, 1954, X rays of the skull revealed a hydrocephalic condition. The child was referred to the neurology department where the neurologist gave a diagnosis of internal hydrocephalus due to a posterior fossa tumor. On Jan. 17, 1955, a craniectomy was performed and a cyst was removed below the cerebellum. Postoperative course was uneventful and he was discharged after 23 days.

By May, 1955, he was back on the schedule for physical, functional, and occupational therapy,

Sp[illegible] was normal. In June, 1955, he was fitted f[illegible]ng leg braces with a pelvic band. The braces [illegible]slip locks at the hips and knees with 90 degree [illegible]erior stops at the ankles. The braces were pre[illegible]ibed to facilitate the teaching of ambulation.

The child showed marked behavioral and motor improvement. He was more alert and was able to stand and walk within the parallel bars. By March, 1956, Michael had begun to master the tripod training canes in conjunction with his long leg braces and was walking, using the 4 point gait, with a fair amount of control and confidence. In October, 1956, he was transferred to the cerebral palsy class of Public School 67 where he is making further progress in independent ambulation.

The *Review* invites case reports from physical therapists who have followed an interesting course of treatment with or an unusual response to treatment by patients having one of the conditions listed below.

Diabetic neuropathy
Paralysis agitans—postchemopallidectomy
Volkmann's ischemic contracture
Dupuytren's contracture
Osteoarthritis
Coronary thrombosis
Cerebral palsy with sensory disturbance
Postmastectomy lymphedema

NOTE: Suggestions for preparation of case reports were published in the October 1957 issue of the *Review*, pages 666-667. Reprints of the suggestions may be requested by writing to the *Physical Therapy Review*.

Suggestions from the Field

Cane for Elbow Flexion Contracture

D. Jean Dutro, B.S.

Incorporating principles previously used in adapting crutches and canes, this platform cane has been devised for a severely involved spastic quadriplegic cerebral palsy patient with apparent ataxia. This child has a fixed elbow flexion contracture and forearm pronation deformity as well as limited use of his hands. The cane may be useful to other patients having elbow flexion deformities.

A height-adjustable conventional Lofstrand crutch base has been adapted with a 9½ inch, 24 st aluminum alloy platform the length of which is determined by the length of the patient's forearm. Two #832 screws hold the platform in place. The angle of platform and cane can be adjusted to the degree of contracture present with additional adjustability in the base of the cane. Two 8 inch padded cuffs have been riveted into place and may be shallowed or deepened to accommodate the circumference of the patient's forearm. Length of the forearm and hand position determine placement of the cuffs. A 4½ inch piece of shellacked wooden dowel (¾ inch in diameter) has been bolted (¼-20 bolt) to the distal end of the platform. Circumference of the dowel depends upon the size of the patient's hand and his ability to grasp.

Figure 1. Child utilizing platform cane.

Senior Staff Therapist, Crippled Children's Hospital, 200 Henry Clay Avenue, New Orleans, Louisiana.
Acknowledgment is given to Elwood Cantelli, Orthotist.

This cane has contributed a great deal to this patient's standing balance and makes gait training possible. Although a stable support is provided to the forearm and the wrist is maintained in a neutral position, the cane may be easily released should the patient fall.

Versatile Parallel Bars

Margaret M. Prior, B.S., and D. LaVonne Jaeger, B.S.

This unit fulfills the need for a set of parallel bars which requires a minimum of space and may be adjusted for use by the smallest child or the tallest adult.

The basic bars (Fig. 1) are adjustable in height from 29 inches to 40 inches and in width from zero to 24 inches. The two ends of the basic bars are mounted on movable metal plates. When one bar is pushed forward, the metal plates pivot causing the bars to draw closer together. Reverse motion separates the bars. Height is varied by means of a metal pin. The child's bars (Fig. 2), being adjustable in height from 19 inches to 30 inches and in width from zero to 18 inches, are attached to the basic bars. Variation in the height and width of the child's bars can be obtained by adjustment of the basic bars. The attachment device of the child's bars allows pressure downward and outward; however, a pull upward and inward will cause these bars to move, thus helping to eliminate or avoid the development of an undesirable habit.

The child's bars were fabricated according to our specifications and are made of 1 inch galvanized pipe. The ends of the pipe, which are covered with conventional pipe caps, extend past the uprights of the basic bars to provide stability. The hooks on the child's bars are made of ½ inch galvanized pipe which is attached to the horizontal bar by a "T" joint. The hook end is bent to fit over the basic bars and is covered with sturdy rubber tubing which prevents slipping. The basic bars are a commercial product which were selected for their desirable features in regard to adjustability and sturdiness of construction. The basic unit and the child's bars attachment can be made in any desired length to suit the needs of the smallest or largest department.

Margaret M. Prior, Chief Physical Therapist, D. LaVonne Jaeger, Physical Therapist, Kenosha Hospital, Kenosha, Wisconsin.

Figure 1. Basic bars.

Figure 2. Child's bars attached to basic bars.

Editorial

Objectivity

In any branch of medicine, a pathological condition for which there is no specific remedy is approached by widely divergent methods. Until the fundamentals of pathology and physiology are fully understood, systems of management are largely empirical; indeed, an entire system of treatment has been built around a medication in use at the propitious moment of remission in a patient's illness. Only too familiar are the blind alleys of hoped-for cures in arthritis.

As a body of knowledge amasses about a disease, the types of treatment proposed change in character; often it is difficult to determine whether a successful treatment method fosters discovery of basic facts or vice versa. At the Annual Conference of the APTA held in Seattle this past June, the program pointed up the stage of development which several disciplines have reached as they explore the field of treatment of the individual with a central nervous system lesion.

It is worthwhile to trace the changing emphasis in the various fields of treatment of neuromuscular diseases. Until the past two decades, the drugs available were chiefly soporifics; bromides and phenobarbital were administered in sufficient amounts to decrease muscle tonus by virtue of cortical inhibition. The major emphasis of the surgeon was upon alinement of body segments in a classical neutral anatomical position, with lesser emphasis placed on function. Physical therapists were highly skilled in the training of isolated muscle contractions and in the use of carefully graded exercise programs.

Several factors were influential in shifting emphasis in treatment. Because antibiotics delayed death, the number of persons chronically disabled from central nervous system lesions was increased; these drugs also made it possible to perform more extensive procedures on laboratory animals, thereby widening horizons for neuroanatomists and neurophysiologists. The surgeon, utilizing new neurologic findings, laid more emphasis on kinetic rather than static positioning and the orientation of therapists pointed more toward gross pattern movements.

The socio-economic scene encouraged the development of groups of brain injured persons for diagnosis, treatment and education, making their behavior characteristics familiar to professional and lay groups alike.

Editorial

Engineers from many disciplines have become familiar figures in centers of medical research and in some instances are members of surgical teams. A greater diversity of instrumental tests and measurements are available to aid in establishing the validity of clinical impressions and to point the way by which wishful thinking may be avoided.

This author was recently privileged to attend the Seattle Conference, an important milestone in the development of the profession of physical therapy. Here were presented the fundamentals of neurophysiology which are known today. Without this background so ably presented by Dr. Ernst Fischer, whose paper appears in this issue, a critical evaluation of the original ideas presented in the remainder of the program would not be possible. Dr. Lawrence Knopp of the Department of Neurosurgery, University of Washington, melded knowledge from fields which were formerly considered widely divergent. His presentation demonstrated the interdependence of neurology and orthopedics.

Most important, however, was the demonstration of objectivity, with the appearance on one platform of the originators of three of the systems currently used in treatment of abnormal muscle behavior. The proponent of each technic, beginning with a different basic philosophy, had developed her method because of successful applications.

It became apparent that each was seeking to alter movement patterns, using a systematic routine, which differed widely from the other two. While the changes brought about by growth and development and the personal magnetism of the therapist cannot be overlooked, yet these different methods apparently produce changes over and above these factors. Obvious also was the fact that one of our greatest needs is means whereby the effect of different forms of exercise can be measured objectively. When these means are at hand, many of the questions raised at the Conference will be answered.

The how and why of the technics of Miss Knott, Miss Rood and Mrs. Bobath were not the most important concepts to be formulated at the Conference. Of greater significance to all in the field of health, was the demonstration that we can recognize a continued growth of knowledge and make use of all its building stones as they become available.

HARRIET E. GILLETTE, M.D., *Chief,*
Department of Physical Medicine
The J. Hillis Miller Health Center
University of Florida, Gainesville

The Physical Therapy Fund

Requests for a grant from the Physical Therapy Fund should be received before the first of December in order to be considered this next year.

In making a request for a grant the following data should be supplied:

1. Description of project for which grant is requested.
2. Estimated amount of money needed.
3. Estimated time to complete the project.
4. State how project will advance the science of physical therapy.

Be sure the name and address of the applicant is included. Applications should be addressed to the Physical Therapy Fund, Inc., 1790 Broadway, New York 19, New York.

WORLD CONFEDERATION FOR PHYSICAL THERAPY *News*

Summary of Report of the Activities of the World Confederation for Physical Therapy for the year 1957

The report highlights the meeting of the Executive Committee, held July 18-20, at Selwyn College, Cambridge, England.

Present were Miss G. V. M. Griffin, President; Miss M. Elson, 1st Vice-President; Mrs. R. Agersnap, 2nd Vice-President; Monsieur J. Dupuis-Deltor, 3rd Vice-President; Miss S. Honka, Miss G. Gower-Rees, Mrs. J. A. Rien (deputy for Miss Verco) and Miss M. J. Neilson, Hon. Secretary and Hon. Treasurer.

Among the items on the agenda were:

1. Application for Membership from Colombia, South America—
   Provisional approval given pending confirmation by next General meeting.
2. Ethical Principles—
   Final draft approved for transmittal to all Member Organizations for ratification.
3. Revision of Articles of Association—
   To be submitted for approval by next General Assembly.
4. Policy regarding representation at other international meetings—
   Agreed that it should be spread as widely as possible among members of Executive Committee and, failing them, members of Member Organizations at such international meetings in their own country. If an invitation was received for a regional meeting of WHO in a country where there is no member organization the invitation would be declined.
5. Finance—
   The cost of ordinary field and office activities is now more than income—reflecting growth in the organization. It was agreed that the annual contribution must be raised, and a recommendation that it be £16. instead of £8. will be sent to the General Assembly.
6. Brochures—
   Three documents are to be prepared—
   1. A statement of general requirements for physical therapists for use by UN and WHO.
   2. A document for physical therapists initiating training in growth countries, giving more detailed guidance on curriculum, subjects, hours of study, qualification of instructors, etc.
   3. A general propaganda document based on present Fact Sheet.
7. Paris Congress—
   The general plan of the meeting, scientific and social program, was presented by Monsieur Dupuis-Deltor.

The report also showed the continued growth of relationships with other international organizations. The World Confederation for Physical Therapy was officially represented at the following congresses or meetings:

Conference on World Organizations Interested in the Handicapped—New York, January, 1957—Miss M. Elson

Conference on World Organizations Interested in the Handicapped—London, July, 1957—Miss M. Elson, Mrs. R. Agersnap, Miss M. J. Neilson

WHO Tenth Assembly—Geneva, May, 1957—Miss G. V. M. Griffin

WHO Regional Committee for Europe—Copenhagen, September, 1957—Mrs. R. Agersnap

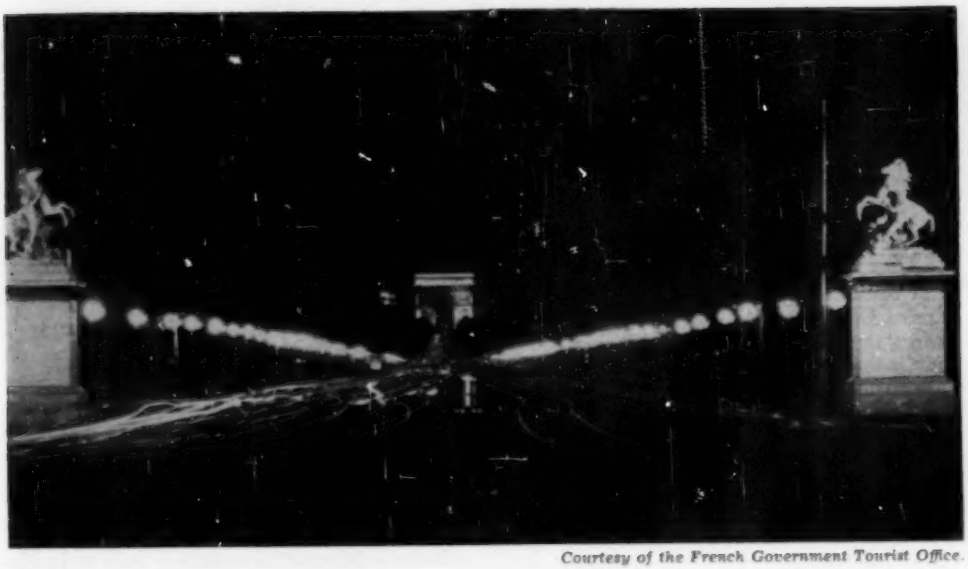
Fourth International Polio Congress—Geneva—July, 1957—Miss M. Margereso, member of C.S.P. and Miss E. Friderichsen, member Danske Fysioterapeuter

Seventh World Congress of I.S.W.C.—London, July, 1957—Miss G. V. M. Griffin

Seventh General Assembly of World Veterans Federation—Berlin, October, 1957—Miss G. V. M. Griffin, Miss A. M. Hauptmann, representative appointed by Zentralverband Krankengymnastik E. V.

Services by correspondence were given to United Nations, World Health Organization, World Veterans Federation by fulfilling requests for information on physical therapy, and by providing names of physical therapists volunteering for service abroad.

The report concluded with the statement that although young in comparison to some other international bodies, each year additional achievements are noted and increased prestige is evident.



Courtesy of the French Government Tourist Office.

Champs-Elysées, Paris, France (night view)

Third Congress

World Confederation for Physical Therapy

Third International Congress—Sunday, Sept. 6, 1959, to Saturday, Sept. 12, 1959.

Place of the Congress—The Congress will be held at the Nouvelle Faculté de Medécine, 45 Rue des Saints Péres, Paris VI^e^, France.

Attendance—The Congress is open to all members of the American Physical Therapy Association.

Opening Ceremony—The opening Ceremony will be held in the famous Palais de Chaillot at 9 A.M. Monday, Sept. 7, 1959.

Theme—The theme of the Congress will be "Physical Therapy—Its Importance in Human Economic and Social Development" with emphasis on Neurology, Geriatrics, Orthopedic Surgery and Traumatology, Rheumatology, Heart and Chest Conditions, Aids and Prostheses, and Psychiatry.

Further information will be published as the program develops.

OFFICIAL LANGUAGE

There will be simultaneous translation of the lectures and discussions in English, French, and German.

General Assembly—A meeting of the General Assembly of the World Confederation for Physical Therapy will be held during the Congress.

Social Events—The following social program is being planned for members of the Congress:

A reception at the Musée du Louvre
A trip on the Seine
An evening at the Opéra de Paris
A reception for foreign representatives at the Hotel de Ville de Paris
An official banquet
A visit to the Chateau de Versailles to see Son et Lumière
A visit to the Chateau de Pierrefonds

For all Association members and other persons planning to attend the Congress from the United States the following arrangements have been made by the American Physical Therapy Association:

Charter Plane—Round-trip reservations may be made on charter flights at a reduced fare. The choice of flight schedules is as follows:

Depart New York Aug. 15, 1959
Arrive London
Depart Paris to New York Sept. 13, 1959
Depart New York Sept. 4, 1959
Arrive Paris
Depart London to New York Oct. 2, 1959

For additional information on charter flights

to the National Office of the American Physical Therapy Association.

Land Tours—American Express Company has arranged two tours for the three weeks prior to the Congress and three weeks after the Congress week. The above charter plane schedules coincide with tour dates. Further information on the European tours may be obtained by writing to:

Mr. V. M. McConnell
American Express Company
65 Broadway
New York 6, New York

or by consulting any local office of the American Express Company.

Accommodations—American Express Company is the official agent for accommodations in Paris. Full information will be available at a later date.

PRE- AND POST-CONGRESS COURSES

Great Britain

The Chartered Society of Physiotherapy is planning two courses in or near London in the weeks beginning August 31 and Sept. 14, 1959. The subjects will be Paraplegia and Chest Conditions. It is possible that other courses may also be arranged which physical therapists making an extended stay in Europe could attend.

Denmark

The Danske Fysioterapeuter will be holding its annual postgraduate course during the last week of August, 1959. Physical therapists able to understand Danish would be welcome.

Sweden

The Kvinnliga Legitimerade Sjukgymnasters Riksforbund will give assistance to any physical therapist attending the Paris Congress who would like to study in Sweden at any time before or after the Congress.

Definite information regarding these and additional courses will be publicized later.

Index to Current Literature

(continued from page 738)

Physiotherapy and the Radcliffe Respiration Pump. Ann Symons, Physiotherapy, 44: 191-195, July 1958

Paradoxical Motion of the Abdominal Wall in Rupture of the Diaphragm. Alfred Lui, et al, Surgery, 44: 295-298, August 1958

Respiratory Pattern and Respiratory Response to CO_2. K. Schaefer, J. Appl. Physiol., 13: 1-14, July 1958

Sequence of Action of the Diaphragm and Intercostal Muscles During Respiration: I. Inspiration. G. H. Koepke, E. M. Smith, A. J. Murphy and D. G. Dickinson, Arch. Phys. M., 39: 426-430, July 1958

SPEECH

A Simplified X-Ray Technique for the Study of Soft Palate Function in Patients with Poor Speech. Peter Randall, A. Edward O'Hara and Frank P. Bakes, Plast. Reconstruct. Surg., 21: 345-356, May 1958

MISCELLANEOUS

Education and Instruction of Patients in Private Practice. J. R. Gay, J. Am. M. Ass., 167: 1616-1618, July 26, 1958

Interpersonal Processes in a Respirator Center. C. P. Deutsch, I. E. Alger, E. McNamara, J. Williams, J. F. Shor and J. G. Benton, Arch. Phys. M., 39: 417-425, July 1958

The Army Reserve—Nurse and Medical Specialist. Inez Haynes, Mil. M., 123: 53-55, July 1958

The Unusual in Psoriasis. Henry Michelson, A. M. A. Arch. Dermat., 78: 9-13, July 1958

What is Research? Willard C. Olson, J. Michigan M. Soc., 57: 991-993, July 1958

Where Do We Stand on Cancer, Heart Disease and Mental Illness? Alton L. Blakeslee, Today's Health, 36: 16-20, August 1958

Original Papers for Conference

Members of the Association who have been working on special projects related to physical therapy procedures—research, clinical or laboratory; reviewing results achieved with a group of patients; adaptation or application of new methods of treatment; or any other subject which will advance the profession should plan now to report their work in Minneapolis next June.

Two copies of manuscript, typed (double-spaced), should be submitted to Dorothy E. Voss, Editor-in-Chief, *Physical Therapy Review*, by April 1, 1959. The *Review* Editorial Board will select papers to be read by members and has the prerogative of publishing those papers selected. Members will be notified of the Board's decision not later than April 25.

Association News

Mrs. M. Anne B. Blakeley of Pittsburgh, Pennsylvania, passed away suddenly on Aug. 31, 1958. Mrs. Blakeley graduated from Bethany College in 1955 and received the certificate in physical therapy from D. T. Watson School of Physiatrics in 1956. A member of the Association since her graduation, Mrs. Blakeley had been a member of the Indiana Chapter and Pennsylvania Chapter, Western District.

Marriages

Hilde K. Abraham, of Miami Beach, Fla., to Bruno Hellman, Miami Beach.
Diana L. Baker, of San Francisco, Calif., to Robert D. Freisem, Monterey, Calif.
Edith Caster, of Twin Falls, Idaho, now Mrs. Edith C. McCullough, Moscow, Idaho.
Mildred M. Coles, of Walnut Creek, Calif., now Mrs. Mildred C. Kasper, Crescent City, Calif.
Peggy Cox, of Shreveport, La., to Edward Bowles, Louisville, Ky.
Rosalie Dansker, of Winthrop, Mass., to Milton Kaufman, Dorchester, Mass.
Pauline L. Demers, of Boston, Mass., now Mrs. Pauline D. Taricco, Brookline, Mass.
Marcella A. Frato, of University Heights, Ohio, to Louis Castellarin, Milwaukee, Wis.
Joyce Hochman, of Pittsburgh, Pa., to Myron LaBan, Ann Arbor, Mich.
Lois Ineson, of Rocky Hill, Conn., now Mrs. Lois I. Roberts, Syracuse, N. Y.
B. Lee Katz, of Los Angeles, Calif., to Robert Kaplan, Los Angeles.
Irene Kazmierowicz, of Denver, Colo., to Ted Guttadore, Aurora, Colo.
Marjorie R. Kline, of Carlton, Pa., now Mrs. Marjorie K. Till, Pittsburgh, Pa.
Helen A. Knubel, of New Rochelle, N. Y., to Donald D. Perry, Morristown, N. J.
Lilah J. Laughlin, of Great Lakes, Ill., now Mrs. Lilah L. Reiels, Palo Alto, Calif.
Anne M. Lombard, of Ipswich, Mass., to William M. Weston, Ipswich.
Patricia K. Marek, of Cudahy, Wis., now Mrs. Patricia M. Potos, Cudahy.
Jean McCarty, of Daytona Beach, Fla., to Richard N. Crist, Warrington, Fla.
Josephine A. Pack, of Fort Belvoir, Va., to Miller Smith, Fort Belvoir.
Barbara M. Robertson, of Fort Sam Houston, Tex., now Mrs. Barbara R. Friz, Bethesda, Md.
Betty B. Schendel, of Mankato, Minn., now Mrs. Betty S. Smith, Madelia, Minn.
Nancy E. Taft, of Fort Knox, Ky., to Carlton F. Whitman, Samson, Ala.
Sandra A. Thorn, of Union, N. J., to Melvin Stahler, Irvington, N. J.
Margaret A. Townsend, of Jamaica Plain, Mass., now Mrs. Margaret T. Chapin, Newton Highlands, Mass.
Barbara Tindall, of Ardmore, Pa., to Neill Graham, San Francisco, Calif.
Elizabeth R. Uricchio, of West Hartford, Conn., now Mrs. Elizabeth U. Hoppen, Hartford, Conn.
Kay Wilson, of Detroit, Mich., now Mrs. Kay W. Arnold, Royal Oak, Mich.

The Return

Our new film, "*The Return*," is now available after one year of work on the part of the members of the Association; Consultants in the Department of Professional Education under the expert guidance and assistance of Mary E. Haskell, then Executive Director; and the producers.

A 38 minute, 16 mm black and white documentary in dramatic form, it tells a story which is thoroughly familiar to every physical therapist: a young man becomes a paraplegic as a result of an automobile accident, and is helped back to independence by a physical therapist in cooperation with other hospital staff. However familiar it may be, you will find it a deeply moving story.

Produced under a $30,000.00 grant from the Office of Vocational Rehabilitation, Department of Health, Education, and Welfare, the script and the shooting were supervised by an advisory committee of physical therapists, who made two trips to New York during the shooting. The Advisory Committee consisted of: Miss Clara Arrington, Physical Therapy Consultant, Division of Health Services, Children's Bureau, Washington, D. C.; Miss Laura K. Smith, Southwestern Poliomyelitis Respiratory and Rehabilitation Center, Houston, Texas; and Mr. Bernard R. Strohm, Instructor, Physical Therapy School, Ohio State University, Columbus, Ohio. Miss Mildred Elson, former Executive Director of the APTA, and presently First Vice-President of the World Confederation for Physical Therapy, was technical advisor, and was present on location throughout the filming of the story.

The film was produced by M. P. O. Productions Inc., producers of such medical films as "*Secret Of The Heart*," "*A Horse . . . A Calf . . . And An Egg*," "*The Good Seed*," and a full length feature, "*Secret Of The Reef*," highly praised by *Time* and *Newsweek* magazines.

The principals in "*The Return*" are Robin Howard, pretty young folksong singer and actress, and 22 year old Liam Clancy, young Irish actor, who has had some local success in

off-Broadway production, *"Guests Of The ation."*

Dr. Howard A. Rusk had this to say about *"The Return"*: "An appealing and sensitive film; it conveys such a message that it may well turn out to be the most important grant OVR has ever made."

Short TV version. A special 28 minute version of *"The Return"* is available through the National Office for TV showing. An intelligent cutting job has been done, but ten minutes represent 25 per cent of the running time. Much action elucidating the work of physical therapists had to be sacrificed, as well as a staff conference and a sequence on occupational therapy. We strongly recommend the longer version wherever it is possible to use it.

One minute spot. We have extracted scenes from *"The Return"* to make up a 58 second TV spot, defining physical therapy, and showing several modalities. This is available from the National Office.

Local distribution. We expect to publish a list of distributors in the December issue of *Physical Therapy Review*. In the meantime, Chapter Presidents, District Chairmen, and Recruitment Chairmen can tell you how to borrow the film. Some centers charge only for shipping costs and insurance; others have service fees varying from 50¢ to $2.00.

This film has had a wonderful reception by all who saw the preview, and we are all proud of it.

New York Times Critic Reviews *The Return*

The New York Times, Sunday, October 14, 1958, carried the following review of the Association's new film, *The Return*. The review was prepared by Howard Thompson, New York Times' critic of noncommercial films.

"The Return (38 min.): This most interesting semidocumentary on the guided rehabilitation of a young paraplegic is intended to recruit young people into the physical therapy field. It should. Perceptively written, directed and produced by Murray Lerner and Lloyd Ritter of MPO Productions, the picture has moments of real power (especially two training scenes at a handrail and on a mat). The authenticity of the excellently photographed background, the New York State Rehabilitation Hospital in West Haverstraw, N. Y., is somewhat offset by the earnest, amateur acting of the staff. But the two professional leads—Liam Clancy, as the disabled boy, and Robin Howard, as his lovely practical therapist—are splendid. Made for the American Physical Therapy Association (at 1790 Broadway)."

Summary of Meeting of House of Delegates June 17, 18, 1958—Seattle, Washington

The House of Delegates of the American Physical Therapy Association convened and conducted its business during three sessions at the 35th Annual Conference. Delegates from 52 chapters, carrying a total of 282 votes, presented credentials and subsequently answered roll call at the opening of each session. States not represented by delegates who would have held a total of 12 votes were Delaware, Maine, Southern Minnesota, Mississippi, Nebraska and Rhode Island.

Agnes Snyder, Speaker of the House, presided. She was assisted in conducting the business by Helen Vaughn, Vice-Speaker, Louise Bailey, Secretary, and Mrs. Byron Lind, Parliamentarian.

Preceding the opening of formal business, the Speaker read the names of Association members deceased within the last year, while the House paid respect by standing for a minute of silence.

A committee composed of Marcia Shaw, Jean Bailey, and Louise Bailey was appointed by the Speaker to edit the minutes.

Elizabeth Wood, Eleanor Barhaug, and James Zimmerman were appointed as Tellers to officiate at elections, with Miss Wood being designated as Chief Teller.

Reports from officers, standing committees, and the President of the Physical Therapy Fund were read and comprised a major part of the business during the opening session. All reports were placed on file [and published in the September issue of the *Physical Therapy Review*.]

The report of the Nominating Committee was presented and the candidates introduced by Thelma Pedersen, member of the Committee, for the Chairman, Margaret Moore. In response to a call for nominations from the floor, the Chief Delegate from Virginia submitted an additional name for the Nominating Committee slate. Following the closing of nominations, the Speaker instructed the delegates on rules of the election and proceeded with reports.

Louise Bailey, Secretary, reported on the Association's business as transacted by the Board

of Directors for the year June 1957 to June 1958, and gave the composite report of data as submitted by chapter and district secretaries.

The Treasurer's report and the Financial Committee's report were given by the Association's Treasurer, Dorothy Hoag. Further, in respect to the finances of the Association, the auditor's report which was distributed to the delegates at time of registration, was approved by unanimous vote.

Other reports read before the assembly were: the Conference Program Committee's report by the Chairman, Gudrun Tandberg; the Judicial Committee report by Clara Arrington, Chairman; report of the *Review* Editorial Board, read by Kathryn Shaffer for the Editor-in-Chief, Sara Jane Houtz; and the report of the Physical Therapy Fund by the Fund's President, E. Jane Carlin.

At the opening session, the delegates were also privileged to hear a presentation by Lillian Long, Ph.D., Director of the Professional Examination Service of the American Public Health Association. Dr. Long and her associates in cooperation with the American Physical Therapy Association have developed test items for use by state examining boards and committees in examining physical therapists in the various states. A second examination has been developed for use by the Association in examination of foreign-trained physical therapists for membership in the APTA.

Dr. Long highlighted procedures used in devising the tests, the objectives of such examinations, reviewed the problems inherent in examination procedures, and explained the mechanics of administering the examination.

Following Dr. Long's presentation, Charles B. Frasher, Personnel Consultant from the Professional Examination Service, answered questions from the floor.

The first order of business at the second session, following roll call, was the report of the Chief Teller of Elections, Elizabeth Wood. There were 287 votes cast out of a possible 290, resulting in the election of the following persons: (Directors for one and three-year terms and Nominating Committee members for one and two-year terms were elected by plurality, all others by majority of vote.)

President—Agnes Synder
First Vice-President—Mary Elizabeth Kolb
Second Vice-President—Dorothy Hewitt
Secretary—Jean Bailey
Treasurer—Anthony De Rosa
Directors—
One-year term—
E. Jane Carlin, Louise Bailey, Florence Linduff
Two-year term—
Elizabeth Addoms
Three-year term—
Edna Blumenthal, James Bauer, Sarah Bassett, Kathryn Shaffer
Nominating Committee—
One-year term—
Mary Clyde Singleton, Dorothy Wagner
Two-year term—
Beth Phillips, Gladdes Neff
Three-year term—
Virginia Wilson

Introduction of the newly elected officers was made colorful by the presentation of orchid leis sent by the Hawaii Chapter.

Reports from the National Office Staff Consultants were given in a panel presentation, introduced and moderated by Mary Haskell, the Executive Director. Questions from the floor directed to members of the National Office Staff added interest and variety to the format. Questions concerning legislation, curricula planning, refresher courses, functions of the National Office Departments and recruitment were among those posed by the delegates.

Free, spirited, and constructive discussion of old and new business resulted in unanimous action by delegates of several items of vital importance to individual members and to progress of the Association.

The following election procedures, as recommended by the Board of Directors and amended by the House, were adopted for use until such time as they can be proved and prepared as a section on elections for incorporation in the Bylaws:

Section 1. A President, First Vice-President, Second Vice-President, Secretary, Treasurer, shall be elected triennially by majority vote to serve for three years or until their successors are elected.

Ten directors shall be elected in accordance with Bylaw V.

Five members of the Nominating Committee shall be elected in accordance with Bylaw XI.

Section 2. Election by ballot shall be carried out by delegates voting either in person or by proxy as provided in Bylaw VI.

Section 3. A list of nominees shall be published by the American Physical Therapy Association and distributed to the members at least two months prior to the annual conference.

Section 4. At the first meeting of the House of Delegates the First Vice-President shall appoint and instruct tellers who shall act also as inspectors of election.

Section 5. Each delegate shall be identified as a delegate by the tellers and shall receive the number of ballots to which he is entitled.

Section 6. In the case where members vote for two or more candidates for an office, the number of candidates needed to fill the positions who receive the highest number of votes shall be declared elected. In the event of a tie, reballoting shall be held to determine election.

A resolution introduced by the Board of Directors stating the attitude of the American Physical Therapy Association toward its responsibility for standards, education, ethics, and certification of members of the profession, and resolving to request a conference with representatives of the American Congress of Physical Medicine and Rehabilitation and the American Registry of Physical Therapists to present the Association's stand in respect to its responsibilities was adopted. In speaking of the resolution, the President interpreted the stand as being one of whole hearted support for a certifying body which confined itself to certification and which is controlled by physical therapists. The adopted resolution read as follows:

WHEREAS, Physical therapy is a profession; and

WHEREAS, It is the responsibility of a profession to assume leadership in establishing and maintaining standards of service, education, and ethics as well as the certification of the professional competency of its members; and

WHEREAS, Certain of these activities are now being assumed by both the American Physical Therapy Association and by the Board of Registry of the American Registry of Physical Therapists; and

WHEREAS, This situation has resulted in duplication of activities, confusion, and conflict; therefore,

BE IT RESOLVED, That the American Physical Therapy Association request a conference with representatives of the American Congress of Physical Medicine and Rehabilitation and the American Registry of Physical Therapists to present and clarify the stand of the American Physical Therapy Association in respect to its professional responsibilities and prerogatives.

The Board's interpretation of Bylaw VIII, concerning sections was adopted after amendment as follows:

Sections have been established to provide the means of communication and to foster a sense of fellowship among American Physical Therapy Association members having a common interest in a special area.

Sections will direct their activities to the following:

Purpose

(a) To plan and conduct at each annual conference of the Association a meeting for members with special interests to consider common concerns in the interest of the improvement of professional performance.

(b) To keep the total membership of the Association aware of special areas that have implications for the general well-being of the Association.

Established channels are as follows and may be used in sequence or at any level:

Chapters and
House of Delegates, and/or
Board of Directors, and/or
National Consultants

(c) To serve in a consultative capacity to the Association and its members on problems in their area of competence.

The following resolution calling for a Bylaw change affecting dues and the division of monies realized from dues between National, the *Review*, and Chapters, was also passed:

WHEREAS, The growth and development of the American Physical Therapy Association have made ever-increasing strides in recent years; and

WHEREAS, The continued growth and development of our Association are directly proportional to our ability to maintain staff, implement staff, and to finance projects; and

WHEREAS, A change in dues necessitates an amendment of Bylaw III, Section 6, of the Bylaws of the American Physical Therapy Association, a procedure which, by virtue of regulations, as required by Bylaw XIII, cannot be acted upon until the next session of the House of Delegates to be held in 1959

BE IT RESOLVED, That an amendment to Bylaw III, Section 6, be drawn up for presentation to the members of the American Physical Therapy Association at the House of Delegates in Minneapolis in 1959, which incorporates the following changes:

Paragraph 1, Bylaw III, Section 6: On or before May 1st of each year, the dues noted below shall be forwarded to the Association:

(a) Active members—$25
(b), (c) and (d), Student members, Life and Honorary Members, and Associate Members, no change
(e) Inactive members—$4;

Paragraph 2: The annual dues of an Active member shall be allocated as follows:

$5 to the appropriate component chapter;
$5 to the Association's official publication; and
$15 to the National Office of the Association; and

BE IT FURTHER RESOLVED, That the Board of Directors be requested to allocate the dues for Inactive members as follows:

National Office, $2.50; and Chapter, $1.50.

Following a resolution from the Minnesota Chapter embracing a cordial invitation to attend the 1959 Conference, the newly elected Officers, Board, and Nominating Committee members were installed by a beloved Charter Member, Marguerite Irvine. The incoming President Agnes Snyder responded and recognized the retiring President who graciously thanked the host, Washington State Chapter, for hospitality and arrangements.

Chapter members will be pleased to know that Mrs. Lind, Parliamentarian, complimented the delegates upon their astuteness in regard to parliamentary procedure and their lucid delivery when speaking.

The meeting adjourned at 8:20 P.M.

Submitted by:

LOUISE BAILEY
JEAN BAILEY
MARCIA SHAW

Mildred Elson Appointed Project Coordinator

Mildred Elson, former Executive Director of the American Physical Therapy Association, has been appointed project coordinator for the New York City Homestead studies on public home infirmary care and home medical care.

The studies, which were initiated last March, are being financed under grants totalling $53,750.00 made to the Hospital Research and Educational Trust by the New York Foundation and the Office of Vocational Rehabilitation of the Department of Health, Education and Welfare. The Trust's project director for the Homestead studies is Dr. Howard A. Rusk, professor and chairman, Department of Physical Medicine and Rehabilitation, New York University—Bellevue Medical Center.

The Homestead studies are concerned with the analysis of the experience of the New York City Department of Hospitals in a new approach to public home infirmary services for chronically disabled persons. Such units have been established in New York City in some general hospitals. The units are designed to create a non-hospital environment with special provision for the recreational and rehabilitation needs of chronically disabled, and usually older, persons.

Physical Therapists Practicing in Kentucky

Kentucky physical therapists who have not applied for licensure must do so before December 31, 1958 to be eligible under the "grandfather clause." Applications should be directed to:

Miss Elise Draper, Secretary
2511 Concord
Louisville, Kentucky

New Student Members

University of Michigan

Janice Anderson	June A. Koch
LuAnne M. Austin	Faye Lystad
Valerie Beger	Vernice Moody
Elaine Braverman	Sally Shawaker
Martha Dubbs	Donna Stark
Carolyn Exelby	Barbara Stashak
Lois M. Huey	Sallie Steketee
Beata Hyma	Judy Straight
Shirley Jardine	Lucia Strumia

MARGERY LYNCH

Chapter and Membership Consultant

Margery Lynch began her duties as Consultant, Chapter and Membership Department, Nov. 1, 1958, thereby filling the vacancy created in 1956 when Mary E. Haskell assumed the position of Executive Director. Miss Lynch will work with Dorothy E. Voss, Senior Consultant, in all phases of Chapter and Membership work.

A graduate of Russell Sage College, Troy, New York, Miss Lynch entered the physical therapy profession in 1951 when she received the certificate in physical therapy from D. T. Watson School of Physiatrics, Leetsdale, Pennsylvania. Miss Lynch had completed her seventh year as chief physical therapist, Allegheny General Hospital, Pittsburgh, Pennsylvania, upon acceptance of her position in the National Office.

Before the merger of the Western Pennsylvania and Pennsylvania Chapters in 1955, Miss Lynch had served the Western Chapter as Secretary, Program Chairman, and at the time of the merger was a member of the Committee on Bylaws. Since 1955 Miss Lynch has held the posts of Secretary, Chairman and Chief Delegate of the Western District, and has recently resigned as Conference Treasurer for the 1960 Conference to be held in Pittsburgh.

Miss Lynch's appointment brings balance to the National Office staff in that two professional staff members complement the work of each of

the respective departments, Chapter and Membership, Professional Education, and Professional Services. By her appointment our chapters and members will be better served.

One Member's Need for the Association . . . . . and the *Review*

I wish to be transferred to active membership in the Association. I am planning to take my master's degree, as soon as I am financially able, in special education working with slow learners, physically handicapped, and mentally retarded children.

I find I need the *Review* regularly instead of as often as I can borrow one, and I would like the privilege of belonging to this organization and attending its meetings *actively*.

While I won't be working strictly as a physical therapist, my professional training in this field is proving invaluable and is essential in my work with educable mentally retarded children.

I retired from active duty in order to care for my family of four children through infancy and until ready for school. I now wish to reenter a profession and the schools in this county are beginning to give attention to the special needs of their mentally deficient and physically handicapped children. In this field I can use both my teaching experience and my physical therapy training.

In qualifying for my master's degree I will be taking several refresher courses in physical therapy.

I hope you will consider me favorably as a candidate for reinstatement to active membership.

Sincerely,
HELEN LANDON HARRISON
Box 127
Jean, Texas

Chapter News

Florida—Central District

The District has recently elected a parliamentarian to serve during business meetings.

Illinois

The Chapter is providing opportunity for candidates for the State Registration examinations to refresh their knowledge.

Michigan — Eastern District

A member has been appointed to the Michigan Health Council's Committee on Health Careers.

Delinquent members are reminded to pay their dues by "Horror Picture" in the September Newsletter.

Michigan — Western District

"The first fall" meeting was held at Twin Lakes 4-H Camp at Traverse City, the weekend of September 26. Members were housed in cabins having 8 to 10 bunks each. A scientific program was presented but an atmosphere of camping prevailed.

New Jersey

Seventy-five letters from potential students of physical therapy which were routed to the Chapter by the National Office have been followed up locally. Many of these letters were evidence of response to career day programs in the New Jersey schools. The Chapter plans to intensify its recruitment program this fiscal year.

The Chapter is activating a car pool as a means to increasing attendance at meetings.

Texas — Southeast District

Members attending the April 1958 annual meeting of the Chapter voted to provide $500.00 toward establishing a permanent exhibit on physical therapy at the Health Museum in Dallas. The Health Museum will pay the remainder of the expenses and will maintain the exhibit. This is a Texas Chapter project.

Virginia

Physical Therapists and the Law was discussed, by Dr. Charles Whitmore, attorney and physician, at the Chapter's October meeting.

Chapter Committee Chairmen have been asked to submit estimates on the budget needs of their respective committees.

Proposed amendments to the Chapter's Bylaws are outlined with present and proposed wording in two columns.

Washington State

From the September 1958 newsletter:

Thanks to You!

Many letters of thanks and appreciation have been received in regard to the Conference. These will be posted at the September meeting for all to see. All letters were most enthusiastic. Thanks to all the planning and hard work put in by

each of you, the Conference seemed to be a big success.

The opening meeting held on September 4 was "Just for Fun"—newcomers were greeted, good-byes were said to members leaving the area, and conversation was reminiscent of the 1958 Conference.

Wisconsin

"Chapter Profile" as prepared from biographical information collected from members in 1957 revealed that 10 members are authors of articles published in the *Review*; several members have contributed book reviews and abstracts; Wisconsin members have served as National Officers on National Committees (seven Committees related to schools and education), and the *Review* Editorial Board. Members who had held previous Chapter memberships came to the Wisconsin Chapter from 17 different Chapters or Districts. Educational background of the members included 22 different colleges or universities. Additional information gathered was related to special courses attended and special interests within the profession.

The September Newsletter also includes notice of the state licensing examination, and brief biographies of two of the Chapter's Life Members.

Assistant Chief of Army Medical Specialist Corps

Lt. Col. Barbara Robertson Friz of Tacoma, Washington, was sworn in as Assistant Chief of the Army Medical Specialist Corps and Chief of the Physical Therapist Section of the Corps on September 15 in the Office of The Surgeon General of the Army. The oath of office was administered by Lt. Col. J. H. Rouse, JAGC, Chief of the Legal Office in the Office of The Surgeon General.

Attending the ceremony were Colonel Friz' husband, Major Willard C. Friz, MSC, Adjutant, Armed Forces Institute of Pathology; chiefs of divisions in the Office of The Surgeon General; Col. Audrey A. Underkofler, Chief, Medical Specialist Corps, U. S. Air Force; and Mrs. Florence Linduff, Chief Physical Therapist for the Veterans Administration. Also attending were Chiefs of the Physical Therapy and Occupational Therapy Sections at Walter Reed Army Hospital.

Major Gen. S. B. Hays, The Surgeon General, U. S. Army, looks on as Lt. Col. J. H. Rouse, JAGC, swears in Lt. Col. Barbara R. Friz, AMSC, as Chief of the Physical Therapist Section of the Army Medical Service Corps.

The new Chief of the Army's Physical Therapists succeeds Lt. Col. Agnes P. Snyder, AMSC, now Director of the Physical Therapy Course at the Army Medical Service School, Brooke Army Medical Center.

Colonel Friz has served as a physical therapist with the Army Medical Service since 1937, in various hospitals throughout the United States. During World War II she served three years in the Pacific Theater of Operations.

Editor's note: Barbara Robertson Friz has been an active member of the Association since 1938 and has served our chapters in Colorado, District of Columbia, Texas, and Washington State. Mrs. Friz was appointed Associate Editor of the *Physical Therapy Review* in 1956 and has recently accepted the Chairmanship of the *Review's* Editorial Board.

Coming Meetings

November 6-8	Gerontological Society, Inc., Bellevue Stratford Hotel, Philadelphia
November 10-14	American Hospital Association —American Physical Therapy Association Institute for Physical Therapists, Bellerive Hotel, Kansas City, Mo.
November 16-20	National Society for Crippled Children and Adults, Statler Hilton Hotel, Dallas
November 17-19	Association of Military Surgeons of the United States, Hotel Statler, Washington, D. C.

Student Column

Graduate Study

When you contemplate your future in your newly chosen profession do you find yourself thinking you would like to instruct or supervise others, administer a department or treatment center, serve as a resource person or consultant, or conduct a research program? Would you like to fill a vital role in providing a higher quality of patient care? Do you have a desire to provide leadership in the profession of physical therapy? You can attain any of the above objectives with a well-planned program of graduate study.

Planning such a program requires that you establish objectives which, to be attainable, must be based on what you wish to accomplish immediately and in the future, what basic preparation you have, and what additional experience and preparation, including guidance from others, you need so as to reach your goals.

Your study now as a physical therapy student can help you begin the groundwork for future graduate study—the two educational experiences are closer than perhaps you realized and, indeed, are separated only by timing. By setting high educational goals and developing a high level of competence in professional knowledge and skills, you can make every course, every patient contact, every aspect of clinical practice, every exposure to learning an experience from which you can derive the most good, the most meaning, the most growth for yourself. Respect each educational experience as an opportunity to build on the fundamental principles of biological, physical and social sciences and their relationships to patient care. Develop an inquiring mind that will compel you to pursue the "why" and the "how." Intellectual curiosity will help you to grasp principles and to relate facts to the application of knowledge in the practical situation. The extent to which you participate in educational experiences will determine the manner in which you acquire values and skills. After graduation careful choice of employment will help you to gain clinical experience whereby previously gained academic and clinical knowledge is implemented. As your professional career develops, you should be able to evaluate your response to your work situation so that you can determine the areas of greatest interest to you. Is it to be teaching, supervision, administration, research?

When you are ready to enter graduate study, set up a coordinated liberal and flexible curriculum which will allow you to overcome any inadequacies in academic knowledge or clinical experience, and which will best help you to improve your abilities and understandings. When you study university catalogs and investigate program offerings you should look for answers to the following questions:

1. Is the institution accredited by its regional accrediting association?
2. What is the philosophy of the institution toward graduate education? Does it encourage thorough scholarship? Does it promote assumption of responsibility by its students? Does it help them to move toward self-direction?
3. Do the persons responsible for the program have special competence? Are the faculty persons leaders in their specialty? Have they published professional articles or books? Have they contributed to the growth and recognition of their field?
4. Are the physical facilities (classrooms, laboratories, libraries, and material for research) adequate?
5. What guidance is offered to students? If you are to engage in research is there freedom to proceed with guidance? If you are preparing for teaching is there supervised practice teaching? What opportunity for field experience is provided so as to develop supervisory and administrative skills? Do students participate in setting objectives of courses? Does the faculty assist in evaluation of the student's progress toward the goals of his program? Is the climate sufficiently permissive to encourage exchange of opinion and freedom of expression? Is help with personal and professional problems available?

After careful study of available offerings in relation to self-evaluation of one's abilities and objectives, guidelines which will assist in choice of program and of institution should become evident. Full time study is better for all concerned, and in most cases provides the greatest return for time and effort expended. It provides continuity, concentrated effort, and sound coordination of program. If financial assistance is needed, information may be requested from the educational institution of choice, the APTA, and private and governmental health and welfare agencies and organizations. There are many library references listing sources of financial assistance for graduate study. If full time study is not possible, many colleges and universities offer part-time study courses during evenings and on Saturdays. The

Placement Service of the APTA may be able to find for you a clinical job in the university city where part-time study opportunities are available.

Your program can be planned to broaden your total professional knowledge or to intensify one aspect of professional practice; for example —a general program touching on further study in one of the basic sciences (anatomy or physiology) plus courses in organization and administration; or a program with entire concentration on one of the basic sciences with primary emphasis on research; or a program dealing exclusively with courses in education and practice teaching. An infinite variety of possibilities exists. One graduate physical therapist majored in business administration and feels her program has helped her greatly in her job as administrator of a rehabilitation center. Another graduate student specialized in guidance and counseling technics and finds that in her position as a clinical supervisor her skills in counseling were helpful in working with physical therapy students and with patients. You may wish to add to the area of professional knowledge by doing research in the basic sciences, or to improve patient care through research in physical therapy procedures, or to enhance your understanding of others through knowledge of the behavioral sciences, or to assume leadership in the field as a teacher, administrator, or consultant. Whatever your desires may be, set your objectives wisely, plan your program carefully, and participate fully in all ways. Thus, you will have the satisfying experience of fulfilling your ideals and those of your profession. Fulfillment will result in better patient care as well as growth and recognition of physical therapy.

HELEN HICKEY KLEIN, *Consultant*
Department of Professional Education

What Lies Ahead

Sixteen years of our lives have been spent in getting an education, and now it is time for us to step out of the student role into a role of responsibility, into our profession and into our communities. How we accept this responsibility and meet the challenges of our time is entirely up to each of us. We find in life exactly what we put into it. No more . . . no less. The choice is ours to make it worthy or cheap.

Let's put our best foot forward and make our future worthwhile by putting into action the knowledge and wisdom that we have gained during our years of study and development.

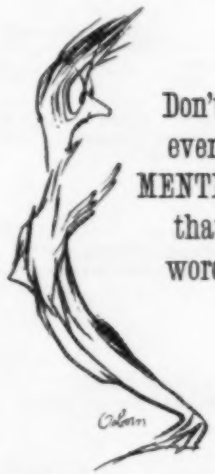
No matter how great or how small be the task placed before us may we always strive to do our best at all times.

— Quoted from *Cherokee Chatter*, Vol. 3, No. 4, the publication of the University of Oklahoma School of Physical Therapy

Washington University

The students at Washington University attended a short two-day course on technics of proprioceptive neuromuscular facilitation which was given by Margaret Knott in St. Louis this year. In addition to their regular study schedules, the class also found time to plan an Open House for interested high school and college students. There has been some discussion of late among Washington U. graduates in and

(continued on page 791)



"Frightened to death" is no figure of speech where cancer is concerned. Each year thousands of Americans lose their lives **needlessly** because they were too terrified about cancer to even learn facts which could have saved their lives! Learn how to protect yourself and your family by writing to "Cancer," c/o your local post office.

American Cancer Society

Schools Offering Courses in Physical Therapy

APPROVED BY THE COUNCIL ON MEDICAL EDUCATION AND HOSPITALS OF THE AMERICAN MEDICAL ASSOCIATION

Schools offering the four year program leading to a baccalaureate degree accept high school graduates and transfer students. Schools offering the 12 to 16 months' program leading to a certificate accept students who have completed all or most of their undergraduate work providing they meet certain course requirements. Recipients of a degree and/or certificate have equal professional status. For specific information regarding each school's entrance requirements, curriculum, tuition and other fees, write to the physical therapy director indicated below. All students should investigate course requirements *early*.

	Degree	*Certificate*
CALIFORNIA		
Mary J. Dodge School of Physical Therapy Childrens Hospital Society 4614 Sunset Boulevard Los Angeles 27	‡	†
Ronald A. Hershey School of Physical Therapy College of Medical Evangelists Loma Linda	†	†
Lucille Daniels Division of Physical Therapy Stanford University Stanford (Palo Alto)	†	†
Margery L. Wagner Curriculum in Physical Therapy University of California The Medical Center San Francisco 22	†	†
Charlotte W. Anderson Department of Physical Therapy University of Southern California Los Angeles 7	†	†
COLORADO		
Dorothy Hoag Curriculum in Physical Therapy University of Colorado Medical School Denver 20	†	†
CONNECTICUT		
James M. Bauer Acting Director School of Physical Therapy U 101 University of Connecticut Storrs	†	
ILLINOIS		
Elizabeth C. Wood Course in Physical Therapy Northwestern University Medical School 303 East Chicago Avenue Chicago 11	†	†
IOWA		
Olive C. Farr Physical Therapy State University of Iowa Hospitals Iowa City		†
KANSAS		
Ruth G. Monteith Section of Physical Therapy Education University of Kansas Medical Center Kansas City 12	†	†
LOUISIANA		
Isadore Brown, Acting School of Physical Therapy Charity Hospital of Louisiana New Orleans 12		†
MASSACHUSETTS		
Adelaide L. McGarrett Physical Therapy Department Boston University Sargent College 785 Commonwealth Avenue Boston 15	†	†
Constance K. Greene Department of Physical Therapy *Bouvé-Boston School, Tufts University Medford 55	†	
Shirley M. Cogland *Program in Physical Therapy Simmons College-Children's Hospital 300 Longwood Avenue Boston 15	†	†
MICHIGAN		
Virginia Wilson Curriculum in Physical Therapy University of Michigan University Hospital Ann Arbor	†	†
MINNESOTA		
Darrell D. Hunt School of Physical Therapy Mayo Clinic Rochester		†
Wilbur L. Moen Course in Physical Therapy University of Minnesota 860 Mayo Memorial Hospital Minneapolis 14	†	

* Accepts women students only.

‡ Baccalaureate degree available from an affiliating college or university.

	Degree	Certificate
MISSOURI		
Sr. M. Imelda, S.S.M. Department of Physical Therapy St. Louis University 1325 South Grand Boulevard St. Louis 4	†	
Beatrice F. Schulz Department of Physical Therapy Washington University School of Medicine 660 So. Kingshighway St. Louis 10	†	
NEW YORK		
Dorothy L. McLaughlin Albany Medical College Division of Physical Therapy Albany 8	‡	†
Mary E. Callahan Courses for Physical Therapists Columbia University College of Physicians & Surgeons 630 West 168th Street New York 32	†	†
Elizabeth C. Addoms Physical Therapy Curriculum School of Education, New York University Washington Square East New York 3	†	†
Mildred F. Heap Program in Physical Therapy University of Buffalo 2183 Main Street Buffalo 14	†	†
NORTH CAROLINA		
Helen Kaiser Division of Physical Therapy Box 3403, Duke Hospital Durham		†
OHIO		
Robert D. Kruse Course in Physical Therapy Frank E. Bunts Educational Institute 2020 East 93rd Street Cleveland 6		†
Gladys G. Woods School of Physical Therapy Ohio State University University Hospital Columbus	†	†
OKLAHOMA		
Thelma Pedersen School of Physical Therapy University of Oklahoma, Medical Center Oklahoma City 4	†	†
PENNSYLVANIA		
Dorothy E. Baethke Division of Physical Therapy University of Pennsylvania 3901 Pine Street Philadelphia 4	†	†
Kathryn Kelley Curriculum in Physical Therapy D. T. Watson School of Physiatrics Leetsdale	‡	†
PUERTO RICO		
(All classes given in Spanish) Lutgarda V. Piñeiro School of Physical & Occupational Therapy Candelaria & Mandry Streets Stop 22, Santurce	†	†
TEXAS		
Doris E. Porter Grady Vaughn School of Physical Therapy Baylor University Hospital Dallas 1	†	†
Cecelia J. Lee School of Physical Therapy Hermann Hospital Houston 25	‡	†
Ruby Decker School of Physical Therapy The University of Texas Medical Branch Galveston	†	†
VIRGINIA		
Susanne Hirt School of Physical Therapy Medical College of Virginia Richmond 19	†	
WISCONSIN		
Beth J. Phillips Curriculum in Physical Therapy Marquette University School of Medicine 561 North 15th Street Milwaukee 3	†	
Margaret Kohli Course in Physical Therapy University of Wisconsin Madison 6	†	
U. S. ARMY MEDICAL SERVICE		
*Physical Therapy Course Army Medical Service School Brooke Army Medical Center Fort Sam Houston, Texas Write to: The Surgeon General Department of the Army Washington 25, D. C. Att.: Personnel Division		†

* Accepts women students only.

‡ Baccalaureate degree available from an affiliating college or university.

Please direct all inquiries regarding tuition, entrance requirements and other specific information to the school and *not* to the American Physical Therapy Association.

Abstracts

The Effective Level of Lumbar Sympathectomy. As Determined by Direct Electrical Stimulation at Operation

W. C. Randall, W. J. Pickett, F. A. Folk and H. J. McNally (Stritch School of Medicine of Loyola University, Chicago), ANN. SURG., 148: 51-58, July 1958

Surgical sympathectomy frequently fails to provide satisfactory clinical results. Careful postoperative studies in such patients generally reveal persistent sweating and vasomotor activity.

The technic of direct electrical stimulation of the sympathetic nervous system in man is adequately described. Also described are the pre- and postoperative studies of patients exposed to a high environmental temperature in a controlled temperature chamber in order to test for residual sweating responses on the operated side.

Experimental results are thoroughly discussed, diagramed and interpreted. Electrodes placed at identical anatomical locations (on the sympathetic trunk at the level of the 2nd lumbar vertebral body) of two different patients revealed a remarkable variation in sympathetic (sudomotor) innervation of the lower extremity. Sparse and scattered sweating was induced in one; profuse sweating on all areas of the lower extremity was elicited on the other patient.

On one patient, conventional sympathectomy (interruption of fibers descending within the sympathetic trunk from the level of disk L2 to disk L4) was performed. Three weeks after operation, profuse sweating on the thigh and calf provided conclusive evidence that this operation failed to denervate much of the lower limb.

Sweating patterns were obtained for the lower extremity in given patients by electrical stimulation at successive levels of the sympathetic trunk from L1 to L5 in each patient. Results showed that levels of entry of preganglionic fibers and levels of exit of postganglionic fibers varied in different patients. No way was found to predict the levels of sympathetic inflow and outflow in a given patient short of actual electrical stimulation. Hence, this procedure serves as a functional tracing of sympathetic pathways to delimit accurately the levels of the sympathetic trunk which control the cutaneous areas of the lower extremity.

These observations focus attention on the fallacy inherent in conventional procedures which result in the extirpation of the same segment of the lumbar trunk in all patients, particularly if the resected segment is small. Extensive (L2-L5 or even L1-L5) operation is frequently necessary to achieve effective denervation and the elimination of marked residual sweating postoperatively. Such indications of more complete denervation have been accompanied by much more satisfactory therapeutic results.

Funnel Chest

Ian D. Sutherland (Highfield House, Scone, Scotland), J. BONE SURG., Brit. Vol., 40-B: 244-251, May 1958

Funnel chest has previously been treated with remedial exercise, usually unsuccessfully. This paper demonstrates improvement through operative correction, illustrated with pre- and postoperative pictures.

The etiology of funnel chest was uncertain until 1939 when it was considered caused by a congenital shortening of the central tendon of the diaphragm. However, biopsies performed in 1953 supported the newer supposition that weakness of the anterior part of the diaphragm resulted in backward displacement of the xiphoid and lower sternum when stronger surrounding muscles contracted during inspiration. Deformity developed with increased growth as the xiphoid and sternum nearly touched the vertebral column, the lower costal cartilages were drawn together and backward and the linea alba shortened, pulling the chest down and producing upper thoracic kyphosis.

Often the deformity is unnoticed until later childhood or adolescence, when already there have occurred secondary postural changes and alterations of the thoracic cage. The thoracic viscera may be affected and occasionally there are respiratory interferences. The heart is often affected because of its displacement. The youngster is generally shy, retiring, and lonely, becoming even more so with physical maturity.

The indications for treatment are orthopedic, physiological, and psychological. The earlier the treatment, the fewer permanent thoracic and postural changes to be overcome.

Operative technic is based on a mechanical defect in the diaphragm attached to the back of the xiphoid and adjacent sixth and seventh costal cartilages. The xiphoid and strong retrosternal ligament are divided from the sternum after a midline incision is made from the angulation of the sternum to below the xiphoid. Pectoral muscles are dissected; the recti abdominis are detached; fourth, fifth and sixth costal cartilages are resected subperichondrially; and a V-shaped osteotomy is made at the point of backward angulation of sternum. The sternum is then elevated forward and sutured in an overcorrective position. Postoperatively deep breathing exercises are begun immediately and physical therapy soon introduces posture exercises.

The results of this operation have been excellent in 12 out of 12 cases in an age group of 5-14 years.

Peripheral Neuropathy in Multiple Sclerosis

Jack Hasson, Robert D. Terry and H. M. Zimmerman (Montefiore Hospital, New York, New York), NEUROLOGY, 8: 503-510, July 1958

Most reviews of literature on multiple sclerosis pay little attention to the peripheral nerves, and some ignore the nerves entirely. It has been stated that the proximal parts of the spinal and cranial nerve roots are often involved but lesions never extend peripherally to the transition zone where oligodendroglia and astrocytes give way to Schwann cells and fibroblasts. The student is thus left to infer that in multiple sclerosis the nerves are invariably normal. It is the purpose of this paper to point out that, while the specific lesion of multiple sclerosis, the demyelinated plaque, is not found peripherally, the nerves are otherwise quite frequently diseased.

The peripheral nerves were studied anatomically in 20 cases of multiple sclerosis. Six cases presented a severe degree of diffuse demyelination, while in 6 other cases the demyelination was slight to moderate. Four case histories are given in detail and include the course of clinical manifestations and subsequent autopsy findings. The cases presented were classic examples of multiple sclerosis both clinically and anatomically. It is well known that in all types of pe-

ripheral neuropathy the distal portion of the nerves are affected most severely. In this study, the highest incidence and the severest degree of demyelination occurred in those cases in which multiple, distal peripheral nerves were examined.

The symptoms of peripheral neuropathy in these patients were apparently masked by the central lesions (of multiple sclerosis). Pain and other sensory disturbances such as paresthesias, as well as muscle weakness, were not attributed to existing neuropathy in a single case. None of the peripheral nerve lesions were focal or plaque-like; all consisted of fascicular demyelination over long stretches. This morphological characteristic was interpreted as indicating that the peripheral neuropathy was not comparable to the "central" lesion of multiple sclerosis. As all 6 patients with severe neuropathy were malnourished, it was attributed to malnutrition and the attendant avitaminosis.

The Vessel Anatomy of the Upper Femur End With Special Regard to the Mechanism of Origin of Different Vascular Disorders

Anders Hulth (University of Uppsala, Sweden), ACTA ORTHOP. SCAND., 27: 192-209, 1958

The vulnerability of the vasculature of the upper end of the femur is due largely to the relatively great part of it being intra-articular as distinguished from the ends of other long bones. Collateral blood supply via periosteal vessels and muscles is lacking. The medial femoral circumflex artery branches within the joint into the superior and inferior retinacula. In childhood only the superior retinacula supplies the epiphysis but does not penetrate the epiphysial plate, crossing only the outer perimeter of it and giving distal branches into the metaphysis. The obturator artery via the ligamentum teres does not contribute to the nourishment of the epiphysis till ages 8-14, but has greater significance in nourishing the femoral head in adult life. When the epiphysial plate disappears the epiphysial and metaphysical circulation anastomose.

The article reports results of venographic methods of examining the vascular network of the upper end of the femur with special emphasis on vascular changes resulting from disease or traumatic lesion.

Avascular necrosis is high especially in displaced fractures of the femoral neck. In trochanteric fractures necrosis and nonunion seldom occur, the intra-osseous intrinsic veins remaining intact and the circumflex veins attached to the proximal fragment. However, the circumflex vein is usually on the distal fragment in fractures of the true neck. If the medial and lateral circumflex veins anastomose around the trochanter region the neck fracture has good vascularity. With displaced fracture of the neck the retinacular branches in the synovial membrane are often torn and circumflex vascularity is only partially retained. Displacement is generally the most significant cause of vessel damage, but the degree of damage cannot be determined by the severity of displacement. The fracture shaft-angle has little bearing on the vascular injury, and the level of fracture is of minimal significance except for the subcapital fractures which have the fewest retained circumflex veins. The foveolar vessels in the ligamentum teres are the only source of nourishment for the head fragment in displaced fractures and these vessels may increase in size.

Traumatic dislocation of the femoral head produces high necrosis which is increased if reduction of the dislocation is not immediate. Usually, the capsular injury is extensive, the teres ligament is torn and the upper retinacular vessels are pinched.

Hip disorders in childhood have been traced to the vulnerable blood supply of the growing epiphysis. No vessels pierce the epiphysial plate as the vessels of both the epiphysis and metaphysis pass within the joint.

There are many theories as to the genesis of the slipped epiphysis: vascular, endrocrinologic, metabolic. The cause is probably compound. Venographic studies indicate that the vessel supply of the epiphysis is most often intact and closed reduction carries the danger of damaging the vessels. Epiphyses having sufficient nourishment from the ligamentum teres may escape vascular disorders.

Legg-Perthes' disease may result from decalcification of the metaphysis indicating a state of hyperemia. The cause is unknown but occasionally there appears a strange arrangement of the epyphysial and metaphysial blood supply. Synovitis was considered a cause because it is evident in the initial stages of the disease, but it disappears when necrosis is manifest.

The author reviews the literature and records his own observations of the vessel supply of the femoral head at different ages.

Residual Function after Subtotal Spinal Cord Transection in Adult Cats

W. F. Windle, J. O. Smart and Jane J. Beers (National Institute of Neurological Diseases and Blindness, National Institute of Health, Public Health Service, Department of Health, Education and Welfare, Bethesda, Maryland), NEUROLOGY, 8: 518-521, July 1958

Regeneration of intraspinal neurons after complete transection of the mammalian spinal cord has previously been described. Experiments have been performed by using Piromen to inhibit the barrier formed by glial tissue. Similar experiments have been performed by surgically wrapping the severed spinal cord in a sheet of Millipore. In these experiments only a small number of the total neurons regenerated and wide gaps were not bridged. In one case potentials were evoked below the site of the transection by stimulating above the lesion with electrodes inserted into the cord. This proved that anatomically regenerated central neurons conducted impulses.

There was no restitution of voluntary motion or recovery of sensation observed, but certain experiments demonstrated functional differences between Piromen-treated spinal cats and nontreated spinal cats. The treated animals had better postural tonus, were less spastic, could support the body better in standing, and some exhibited coordination between forelimbs and hind limbs in locomotion. It took several months for the differences to appear. It was hypothesized that this may have been related to the time required for central regeneration to establish central connections. Unfortunately, the process of recovery did not continue, and after 12 to 18 months all the cats reverted to the typical spinal state. This was coincident with encroachment of heavy connective tissue scars upon the regenerating neurons.

It was felt that, if these functional differences were related to intramedullary regeneration and reestab-

lishment of central connections by a few neurons, it might be possible to demonstrate a similar condition immediately after operation by sparing a few nerve fibers in appropriate places at the time of transection. Hence, the lower thoracic spinal cord was severed in 13 adult cats, leaving the ventral spinal artery and an estimated 10 per cent of the substance of adjacent ventral funiculi intact. For controls, the spinal cord was completely severed in 11 other cats.

The result of this study showed that subtotal transection was followed by retention of some motor function when 1 to 10 per cent of both ventral funiculi remained intact. Tonus and posture were better than in the control animals. Coordinated locomotor function and placing were retained. The activity of these cats resembled that encountered in cats with regenerating central spinal neurons 6 to 9 months after transection. This similarity raises two questions. Did functional regeneration actually take place transiently in the previous studies? If so, did the regenerated neurons establish their specific synapses, or was there a readjustment in the central grey matter? It was felt by the authors that the retention of motor function with so few fibers in these subtotal transection experiments is encouraging to further study of functional restitution by regeneration of central neurons.

Three Years' Experience with Poliomyelitis Vaccine—Ontario, 1955-57

W. G. Brown, G. K. Martin, Beverly Hannah, A. J. Rhodes and N. A. Labzoffsky (Department of Health for the Province of Ontario, Toronto, Ontario), CANAD. M. Ass. J., 79: 155-162, Aug. 1, 1958

Acute anterior poliomyelitis has been reported annually in the Province of Ontario for more than 50 years. Levels of reported incidence have varied from year to year, without any consistent cycle. The incidence of paralytic poliomyelitis has been considered to be more accurately expressive of actual occurrence, since the associated paralysis reduces to a minimum possibilities of errors in diagnosis.

An intensive poliomyelitis vaccination program was carried out among school and pre-school children in the Province of Ontario during 1955, 1956, and 1957. This vaccination program was characterized by uniformity in the vaccine product (Connaught Laboratories), the route of administration, the quantity of dose, and the dosage schedule.

Studies were conducted during these years with a view of assessing the effect of this vaccination program upon the incidence of poliomyelitis. The same basic data were collected each year, laboratory examinations were conducted by the same laboratories and the same medical assessment committee reviewed all case data and classified all cases according to fixed diagnostic criteria.

Certain general observations might be made respecting these studies.

Although the incidence of paralytic poliomyelitis in 1955 was too low to allow any conclusions to be drawn regarding the efficacy of the vaccine, the differences between the attack rates in vaccinated (two or more doses) and unvaccinated children (no vaccine or only one dose) in both 1956 and 1957 were sufficiently great to show that vaccination reduced the incidence of paralytic poliomyelitis in children of 18 years of age and under. This conclusion is felt to be justified in spite of the fact that it is based upon observations made during the course of studies which could not be said to be statistically controlled. Moreover, for obvious reasons, the difference in levels of antibody among the total study group of vaccinated and unvaccinated children could only be assumed.

Clinical and laboratory findings in 1955 led to the recognition of the occurence of cases of aseptic meningitis which undoubtedly had previously been considered to be nonparalytic poliomyelitis. Similar findings in 1956 and 1957 appeared to confirm the 1955 conclusion that nonparalytic poliomyelitis would appear to be quite uncommon, except in areas where paralytic poliomyelitis is prevalent. Consequently, it is suggested that the term nonparalytic poliomyelitis should be discarded as a clinical diagnosis, except where poliomyelitis virus has been isolated from the patient. It is recommended that the term aseptic meningitis be used to describe the syndrome of headache, fever, stiff neck, and pleocytosis in the cerebral spinal fluid which is unaccompanied by paralysis.

Experience relating to the administration of over four million doses of vaccine showed that the use of this immunizing agent, as produced by the Connaught Laboratories of the University of Toronto, was safe and remarkably free from associated reactions. No cases of paralytic poliomyelitis were observed which could be said to be referable to the administration of the vaccine. Out of 121 cases of paralytic poliomyelitis developing in the study group, none had a date of onset 5-28 days after the administration of a dose of poliomyelitis vaccine.

Mandibular Muscle Spasms: Their Role in Head and Neck Pain and Mandibular Dysfunction

Arthur S. Freese (1775 Broadway, New York, N. Y.), N. YORK STATE J. M., 58: 2533-2536, Aug. 1. 1958

Spasm of mandibular musculature is now recognized to be one of the causes of head and neck pain as well as mandibular dysfunction. In order to thoroughly understand the "Mandibular Muscle Spasm Syndrome" one must first familiarize himself with the muscles of this area. After this has been accomplished, etiology, diagnosis, and treatment may be intelligently comprehended.

The syndrome may be caused by trauma, degenerative diseases of the temporomandibular joint, or by a traumatic occlusion and overthrow of the mandible. These causes are organic in origin; whereas, a sudden snap or click of the temporomandibular joint, causing muscle spasm, is classified as a functional type origin.

The primary symptoms accompanying the forgoing causes are pain, mandibular dysfunction, and emotional disturbances. The pain factor is variable. Pain of myofascial origin may be referred to the head and neck and at times to the tongue and throat. The duration of the pain may vary, as does its location. In mandibular dysfunction the chief complaint is that the teeth do not meet properly. The mandible may deviate to one side, or there may be difficulty in opening the mouth more than a few millimeters. Emotional problems, characterized by facial expressions such as gritting the teeth, offer another symptomatic clue to diagnosis of the syndrome.

Treatment of the syndrome consists of treating the patient as a "whole"; that is, including an explanation of the emotional basis for

the problem. In addition to reassuring the patient, physical therapy consisting of moist heat and exercise is usually prescribed. At times it may be necessary to use muscle relaxants for relief of the symptoms.

Prognosis for the complaint of mandibular spasm is mixed. Some cases are terminated successfully in a short period of time, whereas other cases are prolonged until the patient has learned to live with his problems.

The Pathogenesis and Treatment of Idiopathic Scoliosis

Adam Gruca, (Medical Academy Orthopaedic Department, Szustra 43, Warsaw 12, Poland), J. BONE SURG., Am. Vol., 40A: 570-584, June 1958

From repeated observations, the author feels that no passive element such as bone or ligament can withstand the distorting factor in idiopathic scoliosis during the period of growth and that this distorting factor could only be muscle imbalance. The chronaxia of trunk muscles was studied and found never to be identical on both sides of the primary curve. The primary muscle change is due to weakening on the convex side. The secondary change which may be reversible results from stretching and degeneration of the muscles on the convexity. The reflex spasm of the muscles on the concavity especially the short interspinales gradually degenerate and become fibrotic. The muscle imbalance usually occurs in the upper thoracic spine with lateral deviation extending caudad beyond the limit of muscle imbalance. Scapula and arm muscles seem to have no influence on spine deviation but anterolateral abdominal imbalance increases rotation.

If conservative treatment fails to restore muscle balance, transplants are attempted. Illustrations showing the technic and choice of transplants supplement the text. A weak longissimus dorsi is replaced by rhomboideus major or the upper trapezius or the upper part of latissimus dorsi. Hypertonic musculature on the concave side should be weakened by section or denervation.

Secondarily and temporarily weakened muscles on the convexity can be strengthened by artificial muscles. The technic of alloplasty of muscles includes attaching a flattened stainless steel spring to the transverse processes at each end of the convex side of the primary curve. The power and stretching of the spring must be calculated and further investigations along these lines are indicated. Lateral shifting of the thorax by the abdominals is corrected in a second operation by fascial transplants or dermodesis. The tensor fascia lata, lower serratus, trapezius or latissimus dorsi may be transposed; also a dystonic quadratus lumborum is occasionally strengthened by laterally transposing the sacrospinalis.

A springplasty is contraindicated until the second degree scoliosis is reduced to less than 30 degrees. Third degree angulation of more than 60 degrees necessitates a spring screw on the concave side with later excision of articular vertebral processes or wedge resections of the intervertebral disks followed by pulling springs and fusion of the primary curve.

More questions remain to be answered but these procedures have straightened scoliosis in the early stages with further correction parallel to the growth of the patient and have prevented progression of the curvature in very severe cases.

The Interrelationship of Blood Flow, Oxygen Utilization of Blood and Oxygen Consumption of Skeletal Muscle

R. F. Mottram (M. R. C. Group Research on Body Temperature Regulation, Department of Regius Professor of Medicine, The Radcliffe Infirmary, Oxford, England), J. PHYSIOL., LOND., 142: 314-322, July 14, 1958

Statistical studies were performed by the author to find the relationship between blood flow, arteriovenous oxygen difference, and oxygen consumption of human skeletal muscle. An early investigator in this field had found evidence to indicate that blood flow and the metabolic activity of skeletal muscle were independent of each other.

The experiments were performed on 11 healthy male subjects. In 4, both arms were examined and in 1 subject samples were taken from 2 sites in the same arm on different occasions. From 2 to 6 determinations of blood flow and arteriovenous oxygen difference were obtained in a single session.

Three different relationships were investigated:

1. Whether or not blood flow varies inversely with arteriovenous difference, oxygen consumption being constant.
2. Whether or not variations in oxygen consumption produced corresponding variations in blood flow.
3. Whether or not variations in oxygen consumption were accompanied by variations in arteriovenous oxygen difference.

The statistical analysis of the results of this investigation showed that:

1. A significant inverse relationship between blood flow and arteriovenous oxygen difference was seen in 2 out of 16 cases, so it is not always possible to infer changes in blood flow from changes in arteriovenous difference.
2. Oxygen consumption of the resting muscle in the human forearm is a variable and not a constant function, and these variations are usually related to variations in oxygen extraction of the blood passing through the capillaries, and less frequently to variations in blood flow.
3. Oxygen consumption was found to be related to arteriovenous oxygen difference in 13 out of 16 forearms and to blood flow in 4 out of the 16.

Muscle Action, Bone Rarefaction and Bone Formation

M. Geiser and J. Trueta, (Inselpital Bern, Anna Seiler Haus, Berne, Switzerland), J. BONE SURG., Brit. Vol., 40-B: 282-311, May 1958

This paper describes experimental work to study the factors responsible for bone removal in immobilized limbs. Rabbits of both sexes were used, the bones of the foot and leg being radiographed at regular intervals.

In the first experiments, tenotomies were performed on the right calcaneal tendon of 40 rabbits, the left tendon serving as a control. The rabbits were left free after tenotomy but the affected paw was held in dorsiflexion by the animal and was no longer used for jumping or weight bearing. Just visible under lateral radiography one week after tenotomy were the first changes in the foot bones. Two weeks following operation, there occurred increased rarefaction in the fan of trabeculae and in the calcaneal cor-

tey which was more obvious after three weeks. Osteoporosis in the whole tarsus appeared after four weeks and gross rarefaction of the entire foot and ankle was present in the sixth week. If the tenotomy failed to keep the calcaneal tendon severed, bone rarefaction markedly decreased. Angiographs of the injected vessels showed fewer than normal before the sixth postoperative day, but thereafter until the end of the fourth week, increased vascularization was evident. Histologically there were many osteoclasts and also signs of osteoblastic activity four days after the tenotomy when hypervascularity was not yet present. This increased vascularity was found to cease when bone atrophy had reached its final stage.

Twenty two rabbits had right legs immobilized in plaster of paris from the toes to above the knee; the ankles were at right angles or, in several cases, in plantar flexion to relax the calf muscles. There appeared similar changes in the radiographic and angiographic pictures; the main rarefaction taking place within four to five weeks. Immobilization in plantar flexion caused more intensive and quicker rarefaction than when in a position of 90 degrees or less.

Several rabbits immobilized as in the previous experiment were given faradic stimulation to the calf muscles through windows cut in the cast. The rabbits receiving 100 isometric contractions twice a day showed no difference from those receiving no faradic stimulation. One hundred contractions 8 times a day, however, showed minimal bone rarefaction after 4 weeks of immobilization. The electrical stimulation could not produce the same stresses in the bones as the normal activity of the animal.

The fourth experiment involved osteotomy of the right tibia with internal wire fixation and plaster immobilization. The same changes occurred as after simple plaster immobilization with the foot in plantar flexion.

Resection of the peritendinous tissue about the calcaneal tendon resulted in no change in the bone structure of the leg and the rabbits showed no departure from normal.

Lastly, the behavior of osteoporotic bone after muscle activity had been restored was investigated. When muscle constructing force was transmitted to rarefied bone, new bone was formed. Occasionally fractures occurred when compression force was greater than the capacity of the bone to withstand it. Radiographic signs of bone changes did not appear until three or four weeks after the plaster had been removed, showing that bone formation is definitely slower than bone removal. However, there is evidence of hypervascularity in bone formation as well as in bone rarefaction which leads the authors to believe that there is a different balancing factor in the vascular mechanism.

Radiographs and angiographs supplement the written text concerning bone rarefaction resulting from muscle immobilization in rabbits.

Biochemical and Physiological Clues to the Nature of Psoriasis

W. Shelley and R. Arthur (Department of Dermatology, University of Pennsylvania School of Medicine, Philadelphia, Pennsylvania), A.M.A. ARCH. DERMAT., 78: 14-29, July 1958

This article presents an inclusive summary of past experimental work with psoriasis. It deals with studies of the psoriatic patient—the chemical and physiological changes, studies of the eliciting stimulus, and studies of the lesion itself. Aside from the fairly well accepted fact that psoriasis is hereditable disease, there is now a belief that there is a specific defect in the enzyme systems concerned with the protein metabolism of the epidermis.

Acute Poliomyelitis in Private Obstetrical Practice

M. S. Sharp (Lansing, Michigan), AM. J. OBST. 2: 299-304, August 1958

This article considers the relationship of acute anterior poliomyelitis to obstetrics. A review of the literature indicates than in 1932 some writers believed that pregnancy probably conferred some degree of immunity to poliomyelitis. In 1933 it was suggested that the reverse might be true, and subsequent reports indicated that poliomyelitis seemed to have a significantly higher incidence in pregnancy.

Various theories have been advanced to explain the increased association. The earliest one was that the hormones produced during pregnancy caused increased congestion of the respiratory mucous membranes, and consequently, an increased permeability to the virus. Experimental evidence did not substantiate this theory. However, ACTH is increased in pregnancy and according to some workers does increase the susceptibility to poliomyelitis. Fatigue was also considered to be important in the history of pregnant women diagnosed as having poliomyelitis. This was thought to be a possible explanation for the high incidence in multiparas. These women had a number of children to care for during the time of their pregnancy, and were more inclined to be fatigued than primagravidas.

The author presents 9 cases of acute anterior poliomyelitis which occurred in private obstetrical practice. He makes the general observation that the state of fatigue in part determined the prognosis at the time of the acute illness.

Analysis of Falls in Old People

Trevor H. Howell, (Queens Hospital, Croydon, England), J. AM. GERIAT. SOC., 6: 522-525, July 1958

The author assessed the waiting list for Queens Hospital in Croydon, England, and discovered that 4.5 per cent of the 500 patients sought admission because they were subject to falls.

By definition, the act of falling indicates a failure of the mechanism which normally maintains the erect posture in man. This consists of the proprioceptive system and its connections. When 200 healthy pensioners were examined, quite a number of abnormal signs were detected. These included absent or hard to elicit tendon reflexes, impaired vibration sense, inability to rotate wrists rapidly and inability to touch the nose with eyes closed. When the common tendency toward vertigo is added to such lesions, the author feels it is surprising that falls in old people are not more frequent.

In summary, the author states that the clinical lesions giving rise to falls include; 1) general muscle weakness, 2) local muscle weakness in the quadriceps femoris, 3) lesions of the pyramidal tract, 4) lesions of the posterior columns of the spinal cord, 5) Parkinson's disease, 6) syncope from various causes, and 7) an impending deterioration in the condition of the patient. Four tables are included summarizing the data obtained from examination of the nervous systems of the 200 healthy pensioners.

Ambulation Problems in Hemiplegia

E. J. Lorenze, A. J. DeRosa and E. L. Keenan (Cornell University Medical College, New York City), ARCH. PHYS. M., 39: 366-370, June 1958

The purpose of this paper is to determine the causes of failure in the hemiplegic to ambulate independently. Two hundred cases of hemiplegia representing varied etiological factors were reviewed and results presented. All cases were admitted to the rehabilitation service of The Burke Foundation and were unscreened as far as rehabilitation potential was concerned.

In 116 cases success in independent ambulation with or without apparatus was attained. The major cause of failure in the 52 patients who did not achieve independence in this function was muscular disability including paresis, spasticity, and atonicity. Poor motivation was next, followed by unrecovered balance problems and cerebellar syndromes. Patients who were prematurely discharged (unfeasible for rehabilitation), or who deteriorated mentally were not included in the failure group.

Specific problems of muscular weakness and spasticity are outlined. The physical, social, psychological, and vocational status of these patients are included.

Muscular Dystrophy

R. J. S. Reynolds (Queen Mary's Hospital for Children, Carshalton, England), PHYSIOTHERAPY, 44: 164-167, June 1958

The article is a good brief summary of muscular dystrophy. It starts with a description of a typical patient. Then it describes the various types—i.e., the pseudo-hypertrophic type, the fascioscapulohumeral type, the limb girdle type, the myotonic dystrophy, and the amytonia syndrome. The types differ in their picture and progress; however, the aims of treatment are the same in all of them. These aims are 1) to prevent contractures, 2) to retard disuse atrophy, 3) to avoid prolonged bed rest, 4) to prevent or reduce obesity, 5) to retain the ability of self care as long as possible, and 6) to educate and employ if possible.

A corset or jacket is recommended when the process reaches the muscles of the spine and the patient is confined to a chair. This will help maintain the vital capacity, will give a good psychological cosmetic appearance, and will aid the patient in locomotion by helping him to get maximum function from any remaining power in his arms.

The author points out the ultimate solution of the problem of the treatment of muscular dystrophy disease will come from research.

Pulmonary Function in Obese Persons

G. N. Bedell, W. R. Wilson and P. M. Seebohm (Department of Internal Medicine, State University of Iowa, Iowa City), J. CLIN. INVEST., 37: 1049-1059, July 1958

A survey of the literature regarding signs and symptoms of dyspnea, cyanosis, polycythemia, cardiac failure, hypoxemia and alveolar hypoventilation—associated with obesity—is presented briefly.

The article covers a study which was made to determine the frequency of various abnormalities and to investigate the mechanism of alveolar hypoventilation in a number of extremely obese persons. The method of selecting and testing subjects is described. Tables of resulting data appear with an accompanying explanation, discussion, and interpretation of the result data.

The study covered 28 persons who weighed at least 100 pounds more than their ideal weight. Of this group 13 had normal arterial oxygen saturation. Fifteen had hypoxemia and 10 of the 15 had alveolar hypoventilation as manifested by increased arterial P_{CO_2}. Alveolar hypoventilation was associated with myxedema or lung disease.

Obese persons who had normal arterial oxygen saturation had reduced expiratory reserve volumes, reduced maximal breathing capacities, and reduced maximal flow rates. When these patients lost weight, their lung function returned toward normal.

Some obese persons who did not have lung disease did have arterial hypoxemia without hypercapnia. This is believed to be caused by a disturbance in ventilation perfusion ratios in the lungs. However, when alveolar hypoventilation is present (arterial hypoxemia and hypercapnia), intrinsic lung disease, a disturbance of respiratory musculature, or a central nervous system lesion, should be suspected. Obese persons with normal lungs, normal respiratory muscles, and an apparently normal respiratory center did not have alveolar hypoventilation. Most obese persons with pulmonary insufficiency are benefitted by weight loss. Presumably the improvement is caused by reduction in the work of breathing. Obese persons who have lung disease need therapy which is directed toward correcting or alleviating the basic lung disease.

Bell's Palsy: A New Syndrome Associated with Treatment by Nicotinic Acid

Charles E. Kime, (810 South A Street, Richmond, Indiana), A. M. A. ARCH. OTOLAR., 68: 28-32, July 1958

Bell's palsy has been defined as an ischemic palsy of the seventh cranial nerve. It is a sympathetic paralysis, apparently due to vasoconstriction of the arterioles of the peripheral perineural vascular channels of the seventh cranial nerve.

The author points out the other causes of facial nerve paralysis and states that these must be ruled out in order to establish a true diagnosis of Bell's palsy. In recent years, the treatment of Bell's palsy has been either surgical or medical and some authors recommend early surgical decompression of the main trunk. Others feel surgical methods are only indicated when medical treatment fails.

The purpose of this paper is to discuss the treatment of Bell's palsy with nicotinic acid. The author outlines three stages of events.

Stage 1. Onset. Vasoconstriction occurs. Paralysis is primary finding. The nerve will start to degenerate in two or three days.

Stage 2. Beginning nerve degeneration. Immediate restoration of circulation must be accomplished.

Stage 3. Irreversible nerve damage. The nerve requires four to six months to complete its repair.

In this study, 72 of 74 patients were treated within five days of onset. All but 1 patient had excellent recovery. It was not necessary for any of the patients in this group to be treated with electrical stimulation, ACTH, procaine, or histamine as others have recommended. Of the 74 cases treated, 39 were seen

during Stage 1. Every patient demonstrated beginning movement within 7 days and complete recovery within 2 weeks. Thirty-three patients were treated within 3 to 5 days of onset. All had excellent beginning motion within 10 days and full recovery within three weeks. Two patients seen during Stage 3 (2 months after onset of paralysis) had partial movement present 21 days after treatment was started. These patients obtained 80 per cent recovery.

Sugar Paste in the Treatment of Leg Ulcers

A. Rostenberg, Jr., E. Wassermann, and R. Medansky (Department of Dermatology, University of Illinois College of Medicine, 840 Wood Street South, Chicago 12), A.M.A. ARCH. DERMAT., 78: 94, July 1958

The authors agree that sugar paste is not new in the treatment of leg ulcers, but they maintain that most dermatologists are unaware of it. They used a paste containing 30 grams of powdered cane sugar, 60 grams of wool fat (anhydrous lanolin), and 2 cc. of compound benzoin tincture.

They tried the paste on 19 persons with a variety of ulcers—stasis ulcers, decubitus ulcers, scleroderma tous ulcers, and radiation ulcers. All of the patients with decubitus ulcers and half of the patients with stasis ulcers were healed completely of ulcers. Improvement was noted in two to three weeks, and complete healing took an average of three months. The patients with ulcers associated with scleroderma and radiation did not show any improvement.

The authors recommend the use of sugar paste for a variety of ulcerations. From their experience they believe it to be the one most useful remedy.

A Bipolar Stimulating Electrode

Gordon M. Martin (Section of Physical Medicine and Rehabilitation, Mayo Clinic, Rochester, Minnesota), PROC. MAYO CLIN., 33: 364-366, July 9, 1958

A bipolar or biterminal electrode has been designed to supplement the more common procedure of using two separate electrodes for electrical stimulation. The two separate electrodes, active and indifferent, are somewhat cumbersome and often may be sources of technical difficulty. The advantages of a bipolar electrode over two electrodes are:

1. The stimulating current can be better localized to the muscles or nerve being stimulated.

2. Only one connecting wire is required from the machine to the electrode.

3. The troublesome four contacts necessary with two electrodes and two connecting wires are eliminated.

4. The large cold, wet, uncomfortable, indifferent electrode usually placed under the trunk of the patient is eliminated.

5. Rigid arms permit firm contact of both terminals with the skin.

This bipolar electrode consists of a Bakelite handle with one fixed arm and one arm free to rotate 360 degrees. It permits variations up to 8½ inches in distance between the two terminals. The terminal metal buttons pivot on a double ball-and-socket joint so that they may be applied in different planes. The electrode is illustrated and the wiring diagram included in this article.

Our Abstracters for November

We are indebted to the following Association members for their assistance in the preparation of the abstracts appearing in this issue:

Rachel Adams	Carole McNeill
Joan Brewer	Geraldine Midgley
Sam Chelemsky	Miriam Patridge
Jean Cuthbertson	Corrine Strong

Book Reviews . . . . .

The Cerebral Palsied Child: A Guide for Parents. *By Winthrop M. Phelps, M.D., Head of Children's Rehabilitation Institute, Baltimore, Md. Thomas W. Hopkins, Ph.D., Principal, A. Harry Moore School, Jersey City, N. J., Robert Cousins, Editor and Writer. Cloth; price $3.95. Pp. 237. Simon and Schuster, New York, 1958.*

This book is written by Dr. Phelps of the Children's Rehabilitation Institute (a school for cerebral palsied children and a training and research center for professional personnel in this field), Dr. Hopkins, of the A. Harry Moore School (a special school for cerebral palsied and other handicapped children), and Mr. Cousins, parent of a handicapped child. It is offered as a guidepost and reference book for the layman who has a child afflicted with cerebral palsy. The authors are outstanding in their fields and well qualified to produce a work of this kind.

There are several difficulties inherent in this type of effort and one of the first encountered is the problem of presenting technical subject matter in nontechnical terms. The explanations of terms so familiar to those in the cerebral palsy field are very good but it is possible that a parent reader may be confused by the vocabulary, particularly in chapters I and II which define cerebral palsy and discuss its causes, symptoms, classifications, and associated physical defects, and in chapter V which deals with testing of vision, hearing, speech, hand dominance, intelligence, and achievement.

Another problem is that the authors are trying to reach a group of parents with a variety of real problems and many more half-hidden fears. A parent reading this guide on his own, without discussing it with a professional person, may burden himself with needless worry. Discussion of such manifestations as reverse breathing, variable hearing, lack of hand dominance, or seizures may not apply to his child but he may now try to understand some of his child's difficulties with these in mind. On the other hand, the use of this book in conjunction with discussions or consultations with those who are specially trained in the diagnosis, treatment, or education of the cerebral palsied would be extremely valuable. The professional person could advise the parent which paragraphs might be skipped because they are not applicable to his child and which paragraphs should be carefully read and reread to insure his complete understanding. The book answers many important questions and it has further value in that it may suggest many topics for discussion between the parent and the team treating the individual child.

Parents are not disinterested observers of the medical and educational approaches in working with the brain injured; they need and read a book of this type because they are seeking a clearer picture of their own child and a word of encouragement. The authors are to be

commended for the realistic optimism with which they write; while, at the same time, they are extremely cautious not to inspire false hope. The explanation of the therapies involved in the treatment of cerebral palsy are clear and comprehensive and should inspire cooperation between therapist and parent. The parents' role in helping the handicapped child meet the needs of daily living and guiding his development is explained in detail and suggestions are easy to understand and practical. The emotional attitudes and adjustment of both parents and child to each other, to people outside the family, and to school, play, and treatment situations are adequately discussed. The setting of reasonable long-term goals is stressed as is the establishment of preliminary goals which the child can achieve without too much difficulty and thereby be spurred on by his own successes. Types of schools available to the cerebral palsied and vocational possibilities are discussed in the last two chapters. There are two helpful appendixes. The first is a listing by states of the affiliates of the United Cerebral Palsy Association and the second is an annotated regional directory of both day schools and boarding facilities for cerebral palsied and orthopedically handicapped children.

The *Cerebral Palsied Child* is of special value to the physical therapist in that it expresses some of Dr. Phelps' theories, it describes the entire team of personnel and the therapist's place in it, and it provides answers in simple terms to the questions the therapist is asked almost every day.

Fundamentals of Neurology. *By Ernest Gardner, M.D., Professor of Anatomy, Wayne State University College of Medicine, Detroit. Ed. 3. Cloth; price $5.75. Pp. 388; illus. W. B. Saunders Company, Philadelphia, 1958.*

The fundamental concepts of neuroanatomy and neurophysiology are presented in a simple and direct manner. The evidence of neurological functions involves considerable data much of which is still inconclusive. In spite of the wealth of available information, the author has written a book which furnishes the groundwork for an understanding of the subject. The book is divided into 20 chapters according to nervous anatomy and neurological functions. Although the presentation is brief, nevertheless, chapters on peripheral nervous system, excitation and conduction, properties of the reflex arc, the brain stem, control of muscular activity, visceral activity, cerebellum, and motor and senseory functions of the cerebral cortex include the important principles in neurology.

In the third edition special attention has been placed on sensory endings in muscle, on vision, and on basal ganglia. Also an entirely new chapter on neurochemistry has been added. As with the two previous editions, each chapter terminates with a summary, a brief biographical sketch of important investigators, and a well selected bibliography. There are a number of good illustrations and fine diagrams of nervous pathways.

The book is well written and may be recommended to those engaged in medical studies.

Annual Review of Physiology. *By Victor E. Hall, Editor, University of California at Los Angeles; Frederick A. Fuhrman and Arthur C. Giese, Associate Editors, Stanford University, California. Cloth; price $7.00. Pp. 633. Annual Reviews, Inc., Palo Alto, Calif., 1958*

This volume of the *Annual Review* contains many chapters of considerable interest to the field of physical medicine and physical therapy. Probably the most important of these is the review on muscle by Gelfan which contains a particularly lucid exposé of recent work in the contractile proteins, and on the equally exciting subject of excitation—contraction coupling. Also important and clearly written is the review by Mountcastle on the somatic functions of the nervous system, in which the section on the somatic afferent system is matched in importance by the sections on motor mechanisms and reflex activity of the spinal cord. Full use has been made in this chapter of the material in Eccles' new book, *The Physiology of Nerve Cells*. The visceral functions of the nervous system are handled equally well by Patton.

In a review on higher cerebral functions Masland discusses the relation of the reticular system to the maintenance of consciousness, the rhinencephalon and many other subjects in which the author makes a successful attempt to correlate physiological, psychological, and clinical data. The practice of reviewing some aspect of Russian physiology has been continued, and this year's review deals with cardiovascular physiology. As has become the custom, there is a prefatory chapter by an "elder statesman" of physiology. This year the contribution is by Dr. Osterhout who writes on some fundamental problems studied by the use of aquatic organisms, covering a time-span of superb scientific activity of 65 years.

Attitudes of Educators Toward Exceptional Children. *By Norris G. Haring, Ed. D., Coordinator of Services to Exceptional Children, Arlington County Board of Education, Virginia. And George G. Stern, Ph.D., Associate Professor of Psychology; Executive Officer of the Psychological Research Center, Syracuse University, New York. And William M. Cruickshank, Ph.D., Professor of Education and Psychology; Director of Education for Exceptional Children, Syracuse University. Cloth; price $5.00. Pp. 238; illus. Syracuse University Press, Syracuse, N. Y. 1958.*

Dealing with the timely topic of attitudes of educators toward exceptional children, this book is an excellent reference edition for professional workers concerned with this problem. It is a carefully documented study and follows an easy to read narrative style.

The purpose of this book is to report to what extent attitudes of classroom teachers can be modified toward greater acceptance of exceptional children. It describes how the workshop method was utilized in an attempt to modify the attitudes of teachers and administrators toward exceptional children in four different types of schools near Syracuse, New York. Special tests were devised by the authors to be used as instruments for measuring these attitudes. These were carefully validated by trials with summer students attending Syracuse University.

Attitudes of Educators Toward Exceptional Children gives a detailed description of how this Syracuse study was developed as well as a discussion of its major outcomes. Samples of lectures used for orientation at the workshop and descriptions of tests used are included in the appendix.

It should be pointed out that this book is not only unique since few, if any, professional references have dealt with this vital subject, but also

it is very clearly presented. All professionals dealing with exceptional children will welcome this contribution and will be anxious to secure it for their reference libraries and some may possibly use it to assist them in setting up similar in-service studies with their respective staffs. It is the opinion of the reviewer that this book has long been overdue in the field of special education and is even more helpful than other recent materials which have been made available through the Syracuse University Press.

Directory For Exceptional Children. Educational and Training Facilities. *Edited by the staff of Porter Sargent, Publisher. Cloth; price $6.00. Pp. 320. Porter Sargent, Boston, 1958.*

This is the third edition of the *Directory For Exceptional Children* which lists over 2,000 names and addresses of special facilities for the exceptional child. As noted in the introductory remarks of William C. Kvaraceus, Professor of Education at Boston University, the directory provides two essential services: 1) it will keep the professional or lay person in touch with the special facilities throughout the country so as to facilitate advising parents concerning placement of their child; and 2) it will provide the professional investigator with a sampling tool of services available and enrollment figures.

The facilities and agencies are arbitrarily grouped according to the principal features and services offered and the directory appears to cover all essential categories in the field of special education. Within each grouping the listings are catalogued by states in a geographical sequence with the cities listed alphabetically within each state. This method of listing is a bit confusing to the reader until the pattern becomes clear. It would be a moot question, however, as to whether a simple alphabetical listing of states within each group would be more useful or expeditious. In addition to these groupings, there is also a simple listing of facilities classified according to the type of disability served, and a listing of associations, societies, and foundations devoted to the needs of the exceptional child.

Essentially all of the listings provide pertinent information relative to services, staff, enrollment and fees, in addition to address. An indication of quality of services is not within the scope of the directory as it would obviously be an almost insurmountable task to evaluate each facility. Therefore, quality of services will have to be evaluated by persons interested in any specific agency or facility.

This directory serves a useful and practical purpose and should be close at hand to all persons who are called upon to advise parents of exceptional children as to placement possibilities for special education.

Textbook of Pediatrics. *By Waldo E. Nelson, M.D., Professor of Pediatrics, Temple University School of Medicine; Medical Director of St. Christopher Hospital for Children; and 71 contributors. Ed. 6. Cloth; price $15.00. Pp. 1581; illus. W. B. Saunders, Philadelphia, 1954.*

This text is probably the most complete single volume reference currently available in pediatrics. Its many editions (Griffith, Griffith-Mitchell, and Mitchell-Nelson) attest to its value to the student, physician, and pediatrician, as well as to persons in fields related to pediatrics who may be interested in various problems and diseases which involve children.

The distinguished group of contributors to the current volume includes, in addition to the editor, a total of 71 prominent physicians and scientists noted for their contributions to pediatrics and related fields.

This text is divided into 36 sections, including sections concerning the care and evaluation of well children, general factors in the care of sick children, prenatal disturbances, the newborn infant, nutritional disturbances, infectious diseases, poisoning, and disorders involving the major disease classifications and the various systems of the body. A valuable chapter on the physical and psychologic aspects of adolescence is included, as is an appendix containing much useful information regarding normal values, special diets and other miscellaneous data.

It is impossible to completely review a book of this scope. One is impressed that this text is authoritative, is well written and includes pertinent references for each section. The illustrations are clear and the index is complete and accurate. No library is complete without it, and it should be readily available for reference for all who work with children.

The Natural Development of the Child. *By Agatha H. Bowley, Ph.D., F.B.Psy.S., Formerly Senior Lecturer in Child Care, Institute of Education and Child Health, University of London. Cloth; price $3.00. Pp. 206; illus. Williams & Wilkins Company, Baltimore, Md. 1957.*

First published in 1942, the book was written "To give a brief account of the normal growth and development of children from babyhood to adolescence, to indicate when and how difficulties occur, and to show how they can best be handled." The need for a fourth edition at this time is perhaps the best indication that this purpose has been well served.

Dr. Bowley's text is based on the concept that the physician, teacher, and the psychologist are equally concerned with the satisfactory growth and development of the child and that they can learn from each other. The significant milestones in gross motor development, motor coordination, language development, and social and emotional development are all included and are interwoven in a manner which is interesting and easily understood. In the fourth edition some of the most recent developments in our knowledge and attitude toward matters of child care have been outlined and there is additional material on the play of young children and on the special problems of adolescence.

This is a concise and complete book on child development and one which can be highly recommended to professional workers in health education and welfare.

The reviews published here have been prepared by competent authorities and do not necessarily represent the opinions of the American Physical Therapy Association.

Our Book Reviewers for November

Mary A. Blair, D.Ed., Consultant, Special Education, Michigan Department of Public Instruction, Lansing.

Harry D. Bouman, M.D., Professor of Physical Medicine, University of Wisconsin, Madison.

Edward N. Norris, Chief Physical Therapist and Medical Coordinator, Public Schools of Lansing, Michigan.

Joan W. Sarney, Formerly Director of Physical Therapy, House of St. Giles, the Cripple, Brooklyn, New York.

William J. Shriber, M.D., Chief of Physical Medicine, Beth Israel Hospital; Instructor in Medicine, Harvard Medical School, Boston, Massachusetts.

Donald C. Smith, M.D., Associate Professor of Maternal and Child Health, University of Michigan, School of Public Health, Ann Arbor.

Paul F. Wehrle, M.D., Assistant Professor of Pediatrics, State University of New York Upstate Medical Center, Syracuse Memorial Hospital, Department of Pediatrics, Syracuse.

1921-1939 *Physical Therapy Review* Index

An Index of all original articles appearing in the *Review* during the years 1921-1939, Volumes 1-19, is available at $1.00 per copy. Containing 82 pages (duplicating process), the index has a 3 brad binding and paper cover.

Those who are doing research, a review of the history of physical therapy procedures, or a review of the early writing by physical therapists in the United States will find the Index most helpful.

Several copies of the Index, Volumes 20-34, covering the years 1940-1954, are still available at $1.00 per copy. Order now from the American Physical Therapy Association, 1790 Broadway, New York 19, N. Y.

Washington University

(continued from p. 779)

around St. Louis about the formation of a Physical Therapy Alumni Association. All graduates interested in the progress and welfare of their alma mater will no doubt be interested in this proposed organization.

Special Issue—Cerebral Palsy

Additional copies of the November 1958 issue are available from the American Physical Therapy Association, 1790 Broadway, New York 19, New York. Single copies, 75¢ each; 10 to 50 copies, 50¢ each; 50 or more copies, 35¢ each.

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PTR-11-58

What's New . . . . . .

110. Scientific Baby Exerciser

Jolly Jumper permits a baby of 3 months up to walking age to assert his personality and exercise to his heart's content, according to the manufacturer. The exerciser gives the baby security through a soft corset and saddle and the child may control his own activity. A strong elastic "extender" lifts him up in a spry bounce every time he presses his feet against the floor. Increasing pressure increases the "bounce." The baby soon learns that he can stop the action by simply drawing up his knees.

Although the device was designed for normal babies it is likely that children having neuromuscular deficiencies may receive stimulation of mass thrusting of lower extremities and postural reflexes. Jolly Jumper Corp.

For more information on items write to The Physical Therapy Review, 1790 Broadway, New York 19, N. Y.

New items which may be of interest to physical therapists will be mentioned in these pages each month. The accompanying explanations are made by the manufacturers and have not been investigated by the *Physical Therapy Review*.

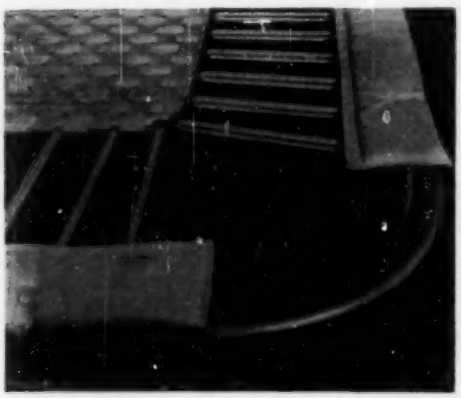
111. Ortho-Tenda® Safety Chair

Ortho-Tenda® Safety Chair is especially constructed for use by children with cerebral palsy or other physical handicaps. Special features include a high backrest with supports on either side; adjustable backrest angle and the footrest may be varied as to angle and height. A slight swing action of the seat is possible if desired or the seat may be held absolutely rigid. Padded cushions for seat and back are covered with water-repellent fabric which may be easily cleaned with a damp cloth. Easy rolling casters permit the chair to be moved without effort, and a safety halter strap is provided. Babee-Tenda Corp.

112. Car Jonn

"Stop and Go" motoring is eliminated with the specially designed children's Car Jonn. Made of heavy-duty waterproofed Fiberoid, it is fitted with a removable contoured plastic toilet seat and friction tight plastic cover. A braided rope handle makes it easy to carry; disposable polyethylene liners are included. Receptacle can also be used for car-sickness and soiled diapers. Travel Aids Co.

113. Nissen Trampolines



Nissen Regulation Trampolines are now constructed with exclusive oval-shaped steel tubing. Developed and tested by Nissen's Bouncing Engineers, the oval tubing gives added strength and rigidity to the frame, yet greatly lowers the weight of the trampoline. The new tubing gives the frame a neat modern look and allows protective frame pads to lie flat. A new catalog describing this and many other Nissen features is available. Nissen Trampoline Co.

114. Bath-Aide

Oltmann Bath-Aide, constructed of lightweight, non-corroding tubing with a vinyl plastic hammock, provides strong and comfortable support for handicapped patients during tub baths. According to the supplier, the device enables the patient to be washed and turned with ease. Lifting children in and out of the tub is made easier as is aiding adults going in and out. Two styles of hammocks are available—flat or bucket type. Use of hammocks permits immersion in the tub to a greater extent than is possible when the usual bathtub seat is used. Available in child and adult sizes. J. A. Preston Corp.

115. Mat Bench

Mat Bench assists patient in muscular development—facilitates balancing exercises, etc. Leg heights are interchangeable for mat exercises or knee walking. The bench is of rigid construction with 6 inch alloy tubing, hardwood and rubber tipped legs, and is ideal for use with wheel chair. Made with a plastic covered foam rubber top,

the device is available in child or adult size. Rehabilitation Products, American Hospital Supply Corp.

Strike Back at Stroke

A recent publication of the Public Health Service, Department of Health, Education, and Welfare, *Strike Back at Stroke*, has been prepared to "help the doctor show what can be done for the stroke patient at home to help prevent or keep to a minimum the disability that often develops after a stroke."

The pamphlet was developed through collaboration with Josephine J. Buchanan, M.D., Chief, Physical Medicine and Rehabilitation Service, and Margaret Sexton, Chief Physical Therapist, of the District of Columbia General Hospital, Washington, D. C. Specialists in all phases of rehabilitation of the hemiplegic were consulted and provided criticism of the content. The American Physical Therapy Association was one of eight national organizations that provided advice in regard to the publication.

Reviewed and endorsed by the appropriate subcommittees of the American Medical Association, the booklet, 37-pages and fully illustrated, is now available at 40 cents per copy. Listed as Public Health Service Publication No. 596, orders should be directed to the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

Positions Available

Physical Therapist for general, voluntary hospital of 560 beds. Registered therapist preferred; 40 hour week. Liberal personnel policies. Salary open. Apply Personnel Director, Allentown Hospital, Allentown, Pa.

PT to assume STAFF POSITION at cerebral palsy outpatient center. Expansion program starting to more than double the present area. Modern ranch-style building. Caseload soon to include all pediatric disabilities. Starting salary with no experience, $4,500. Liberal holidays, paid vacation, sick leave, 5-day week —8:30 to 4:30. For further information contact Vincent J. Privitera, Director, Cerebral Palsy Treatment Center, 808 Crockett, Amarillo, Texas.

GRADUATES OF APPROVED SCHOOLS FOR PHYSICAL THERAPISTS. California has positions open in State Hospitals, the Veterans Home and special schools for handicapped children. Require registration with California Medical Board. Liberal employee benefits and retirement plan. No experience needed to start at $415; first increase after 6 months; promotional opportunities to $530. Write State Personnel Board, Box 71, 801 Capitol Avenue, Sacramento, California.

Opening for second registered physical therapist, Nov. 15, in Cerebral Palsy School in new air-conditioned building. Liberal personnel policies. Salary commensurate with qualifications. Write: Mrs. A. M. Inman, Director, 1601 Gatewood Ave., Greensboro, N. C.

Staff Therapist and Assistant Supervisor. October and November. General Medical and surgical cases, In- and Outpatient Service. Opportunity for varied experience. Salary dependent on experience. Vacation, sick leave and social security benefits. Apply: Miss Mary Mason, Physical Therapy Department, The Johns Hopkins Hospital, Baltimore 5, Maryland.

QUALIFIED PHYSICAL THERAPIST for outpatient cerebral palsy treatment center. Liberal salary. Two months' vacation, sick leave. Liberal personnel policy. Contact Robert Schlitt, Director, Peninsula Cerebral Palsy Training Center, 901-24th Street, Newport News, Virginia.

Physical Therapist—Male or Female—for New Department—Salary open—Good Personnel Policies—Hospital fully approved. Apply: Robert M. Murphy, Administrator, Floyd Hospital, Rome, Georgia.

Positions Available

EXCEPTIONAL OPPORTUNITY Key position, new program for Sr. PHYSICAL THERAPIST, State Home and Training School, Grand Junction, Colorado. Appointment at one of the following salary steps, according to qualifications and experience; $381-400-421-442-465-488. Applications will be accepted until further notice. Contact Porter Carson, Administrative Officer, P.O. Box 690, Grand Junction, Colo.

QUALIFIED PHYSICAL THERAPIST for modern and well equipped department. Within two years present physical therapy shall expand to a multiple disability rehabilitation facility. The cooperative efforts of entire group of local and state health agencies are participating in this dynamic expansion program as defined by the U.S. Government Public Health Service. Excellent opportunity to those who seek a challenge. Liberal personnel policies and salaries are in line with current levels. Write the Personnel Director, Blessing Hospital, Quincy, Illinois.

REGISTERED PHYSICAL THERAPIST (Female). For modern industrial hospital, working under direction of orthopedist. Attractive starting salary, periodic increases. Excellent company benefits; 5-day week. Uniforms furnished. Write Dr. J. F. McCahan, Medical Director, Western Electric Co., Hawthorne Station, Chicago 23, Illinois.

WANTED: Qualified physical therapist for outpatient Cerebral Palsy Clinic; five day week, six weeks' vacation with pay, salary commensurate with experience. Write Dr. F. B. Kilgore, 202 Ritter Building, Huntington, W. Va.

PHYSICAL THERAPIST II: Chief physical therapist position at institution for mentally ill in Hawaii. Requires 2 years physical therapy work experience and graduation from a school of physical therapy approved by the Council on Medical Education and Hospitals of the American Medical Association. Appointments may be made at any salary interval between $381.00 and $443.00 at which a qualified person can be recruited. Continuous recruitment until need is met. For additional information and application WRITE: Mrs. Loretta Fukuda, Recruiting & Examining Supervisor, Dept. of Civil Service, Territory of Hawaii, 825 Mililani St., Honolulu 13, Hawaii.

Wanted—Staff Physical Therapist for Itinerant Home Program Service to Cerebral Palsy. Excellent salary and vacation plan. Applicant must be eligible for registration in New Mexico and be willing to travel extensively. Reply to A. W. Sparks, Executive Director, N. M. Elks Association Cerebral Palsy Program, 422 14th Street SW, Albuquerque, New Mexico.

PHYSICAL THERAPISTS: Staff positions. Opportunity for varied experience; 650-bed general hospital, near center of cultural and educational activities. Vacation, sick leave and social security benefits. Apply Personnel Director, Harper Hospital, Detroit 1, Michigan.

Opening for Staff Physical Therapist in outpatient Rehabilitation Center directed by physiatrist. Wide variety of treatment program. Coordinated physical, occupational, speech-hearing, psychological, vocational, and social services. Excellent personnel policies; up to 3 weeks vacation. Contact R. A. Silvanik, Administrator, The Rehabilitation Center of Summit County, Inc., 326 Locust Street, Akron 2, Ohio.

CHIEF THERAPIST for Children's Convalescent Hospital and rehabilitation center. Salary dependent on qualifications and experience. Liberal vacation, sick leave, and holiday benefits. Male or female. Apply Administrator, Convalescent Hospital for Children, Auburn Avenue and Wellington Place, Cincinnati 19, Ohio.

WANTED: PHYSICAL THERAPIST (female) for full or part-time work in orthopedic surgeon's office. Write to Daniel B. Eck, M.D., 144 South Harrison Street, East Orange, N. J.

WANTED: Registered female physical therapist; new modern 300-bed general hospital; 40-hour week, 6 paid holidays, 2 weeks' vacation annually. Immediate opening. Minimal salary, $375.00. Address: Assistant Administrator, Bishop Clarkson Memorial Hospital, Omaha, Nebraska.

Wanted: Physical therapist for staff of Children's Center. Liberal salary—no experience necessary—40 hour week—6 weeks paid vacation. In- and outpatients treated. Apply: Mrs. Henry A. Johnson, Director, Children's Center, 2315 Coliseum Drive, Winston-Salem, N. C.

(continued on next page)

Classified WANT-ADS

RATES

The rate per insertion is $1.00 per line. Typewrite your advertisement carefully and count 50 characters and spaces per line.

ALL WANT-ADS MUST BE PAID FOR IN ADVANCE. Make checks or money orders payable to the American Physical Therapy Association.

Closing date for copy and cancellations is two months preceding publication date.

Institutions or physical therapists who do not wish their identity known may arrange for Blind Ad Code No. All such want-ads must include the following which will be counted as 2 lines:

Address replies to ..... care of **The Physical Therapy Review, 1790 Broadway, New York 19, N. Y.**

IMPORTANT

It is understood and agreed that the publisher shall have the right to reject or change the wording of any advertisement which in the opinion of the Editorial Board shall not be in agreement with the ethical standing of this publication.

Positions Available

PHYSICAL THERAPIST: $4,718 to $5,198, 40 hours. Vacancy at large county hospital 17 miles west of Detroit. Requirements: American citizenship and completion of an approved course in physical therapy. Apply: Personnel Office, Wayne County General Hospital and Infirmary, Eloise, Michigan.

STAFF OPENING: Work with orthopedic conditions in private clinic separated from physicians' offices. Treatments closely coordinated with referring physicians. Salary open. WRITE: Philip Riddleberger, Director, The Physical Therapy Center, 2220 Jay Street, Sacramento 16, California.

Immediate Opening: Staff RPT and Supervising RPT to help set up and run PT Dept. in 275-bed State Chronic Disease Hospital. Located 2½ miles from Hartford. Staff salary starts at $3,300; Supervisor at $4,200. Maintenance, including Apt., available at low cost. Contact Supt., Cedarcrest Hospital, Newington 11, Conn.

PHYSICAL THERAPIST: Staff position. Opportunity for experience in 450-bed general hospital. Salary range $325.00-$350.00 per month. Paid vacation, 6 paid holidays, Blue Cross-Blue Shield group benefits. Immediate opening. Apply Mr. James Dryden, St. Elizabeth Hospital, 49 Hopeland St., Dayton 8, Ohio.

ASSISTANT CHIEF OF PHYSICAL THERAPY for an attractive and completely equipped department. New general hospital, 370 beds, air conditioned, and in residential area. Department is utilized by all services, has summer student training program, excellent personnel policies, friendly atmosphere. Refer replies to: Mrs. Ruth J. Jones, Chief of Physical Therapy, Richmond Memorial Hospital, Richmond, Virginia.

IMMEDIATE PLACEMENT: Physical therapist for County Physically Handicapped Persons Department, 35 hour week, pension plan, paid vacation, accumulative sick leave, female preferred. For further information contact Broome County Physically Handicapped Persons Department, Room 207 County Office Bldg., Binghamton, N. Y.

STAFF OPENING: Two—immediate—attractive salary and personnel policies. New building and equipment. Give complete detailed training and experience when applying. State time available. Write Superintendent, Idaho Elks' Rehabilitation Center, 204 Fort, Boise, Idaho.

Immediate opening for physical therapist in 140-bed general hospital department. Beginning salary $400. Write Spencer Hospital, Meadville, Pa.

IMMEDIATE OPENING for a registered physical therapist with the ALASKA CRIPPLED CHILDREN'S TREATMENT CENTER. Experience with varied children's physical handicaps. Excellent personnel policies and salary. Apply to Helen H. Dittman. Ph.D., Clinical Director, 1020 I Street, Anchorage, Alaska.

Staff Physical Therapist: APTA Member eligible for N.Y. State Reg.; to work in Department of General Hospital under medical direction. Forty hour week, 4 weeks' vacation, legal holidays and up to 12 sick days per annum. Civil Service and Social security benefits. Salary open. Apply: Personnel Office, Binghamton City Hospital, Binghamton, N. Y.

WANTED: Registered Physical Therapist for a fully accredited children's hospital with an active teaching program. Fully equipped physical therapy department. Variety of cases, 5 day week and good personnel policies. Salary open—dependent on experience. Write Mrs. Charles C. Bogan, Administrative Assistant, Children's Medical Center, 4900 South Lewis, Tulsa, Oklahoma.

PHYSICAL THERAPIST: Wanted for active, well equipped department in a 154-bed hospital with expansion program under way. Pleasant surroundings in north suburb of Chicago. Modern housing. Recreational facilities and cultural activities available. Good salary, 40 hour week, varied cases treated. Contact Personnel Director, Highland Park Hospital, 718 Glenview Avenue, Highland Park, Ill.

PHYSICAL THERAPIST: State crippled children's program. Full team approach. Car provided, 4 weeks' vacation, under Merit System. Retirement benefits. Salary range: PT-I, $4,500-$5,220; PT-II, $4,860-$5,580. Write to Dr. Jack Sabloff, Director, State Board of Health, Division of Crippled Children's Services, Dover, Delaware.

WANTED IMMEDIATELY: Two qualified physical therapists for rapidly expanding department in new modern facility for handicapped children. Beautiful progressive midwest city of 70,000. Completely new department, varied and multiple handicaps, orthopedic supervision, good salary, liberal personnel policies, 40-hour week, 9 weeks paid vacation. Excellent opportunities for study and research. Write or call: Allan Quail, Supervisor Physical Therapy, Crippled Children's Hospital School, 2500 Block W. 26th St., Sioux Falls, S. D.

Immediate placement for additional qualified physical therapists (male or female) for physical medicine and rehabilitation institute serving 2 hospitals in largest centrally located industrial center in Illinois. Full time medical supervision, 5-day 40-hour week, excellent salary range, additional benefits. Write: Business Manager, Institute of Physical Medicine and Rehabilitation, 619 N. Glen Oak Ave., Peoria, Illinois.

Therapist for growing dept. in 360-bed general hospital. Must be eligible for licensure in Minn. 40 hour week. Liberal employee benefits. Salary open. Write Pers. Dir., Miller Hosp., St. Paul, Minn.

REGISTERED STAFF PHYSICAL THERAPIST for well established department in 400-bed general hospital. Wide variety of cases. Forty hr. work week. Salary open. Under the direction of a physiatrist. Apply Director of Physical Medicine Dept., Mt. Carmel Hospital, Columbus, Ohio.

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LIGHT WEIGHT: Densifoam Gym Mats are much lighter and less bulky than other mats: weight only 10 ounces per square foot — therefore it's easy to handle even very large mats.

ECONOMY: Will last years longer than other mats. Unaffected by water, soaps, detergents and most chemicals. Flame resistant and self-extinguishing. Washing with soap and water quickly removes dirt and stains.

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